

INITIAL RIPARIAN AND WETLAND
VEGETATION CLASSIFICATION AND
CHARACTERIZATION OF THE
COLUMBIA BASIN IN WASHINGTON

PREPARED FOR:
ENVIRONMENTAL PROTECTION AGENCY
AND BUREAU OF LAND MANAGEMENT,
SPOKANE DISTRICT

REX C. CRAWFORD, Ph.D.
NATURAL HERITAGE PROGRAM

MARCH 2001



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**INITIAL RIPARIAN AND WETLAND VEGETATION
CLASSIFICATION AND CHARACTERIZATION
OF THE COLUMBIA BASIN IN WASHINGTON**

Rex C. Crawford Ph.D.

Washington Natural Heritage Program
Washington Department of Natural Resources
Olympia, WA 98504-7016

In coordination with:

Bureau of Land Management, Spokane District
Environmental Protection Agency

28 February 2001

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RESEARCH REPORT
NO. 1234
BY
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AND
A. B. JONES
MAY 1964

SUMMARY

This report summarizes the results of a three-year project to inventory the riparian vegetation of Washington's Columbia Basin and to develop a riparian vegetation classification for the area. The Bureau of Land Management, Spokane District, and the Environmental Protection Agency funded this phase of the project for inventory of Douglas and Grant Counties, Washington. Previous inventory was funded by these agencies and the Washington Department of Natural Resources for inventory in Adams, Asotin, Columbia, Garfield, Lincoln, Walla Walla, and Whitman counties.

Sample sites included valley segments on public land and on land owned by cooperating private land owners. Riparian samples are located along ninety-seven stream reach locations. A stream/riparian reach or reaches that typified each valley segment was characterized by eighteen stream variables or ratings. Each stream reach was mapped in vertical profile and as a horizontal map. Eleven physical variables and a plant species list with cover estimates were collected in plots on representative fluvial surfaces at each reach.

Table 1 lists the most frequently sampled of the four hundred and forty-five vascular plant species recorded during inventory by their life form, native or introduced status, and U.S. F.W.S. Region 9 hydrologic status, erosion control potential, short-term and long-term revegetation ability, forage for cattle, and potential to provide cover for mule deer, upland game birds, and waterfowl.

Analysis of vegetation and environmental data collected at two hundred seventy-three sites derived 62 vegetation types. Each type is briefly described including its affinity to the existing national vegetation classification and sources of management recommendation for the type. Types are of existing vegetation and are related to potential vegetation whenever information is available.

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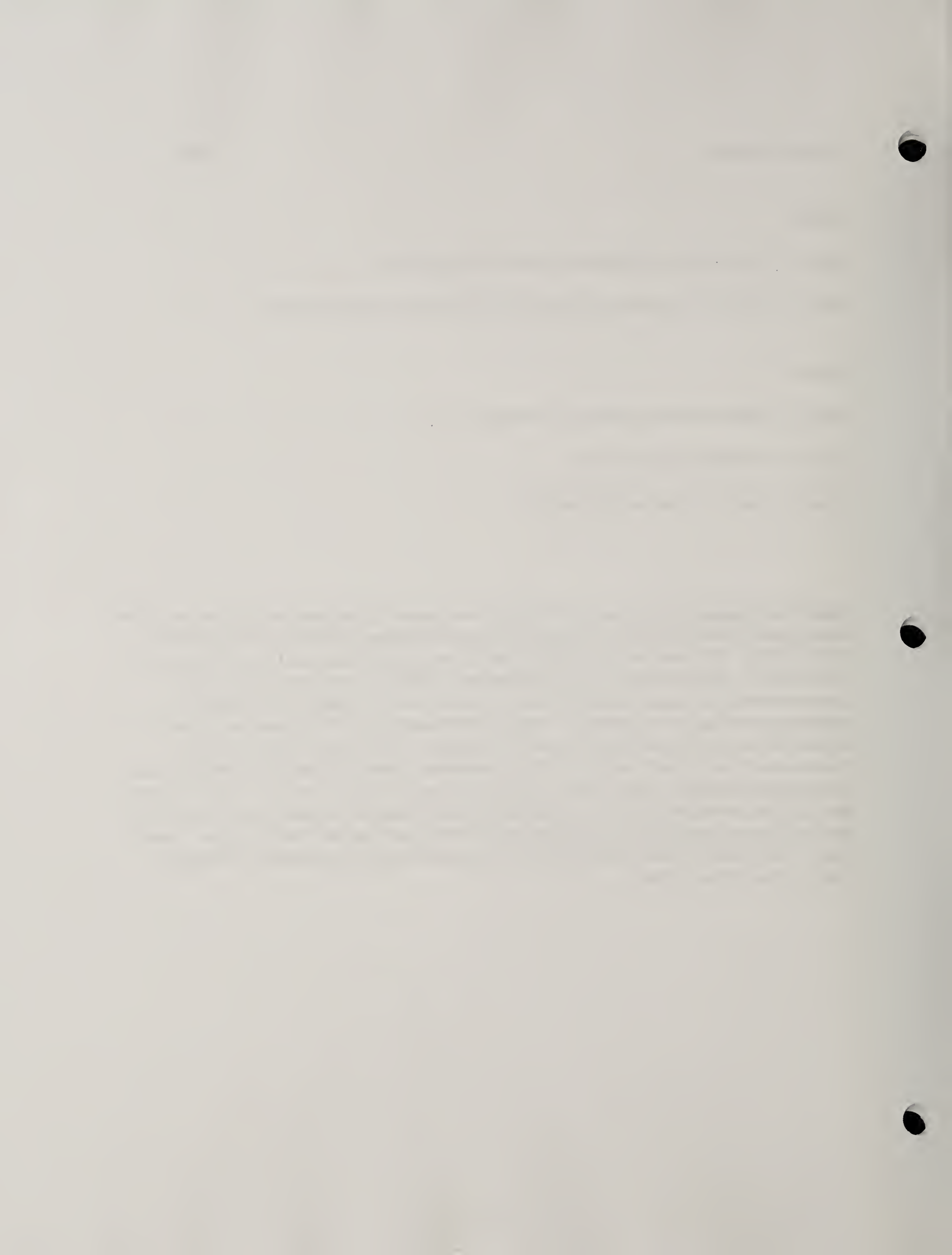
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Acknowledgements: This phase of the project was funded by Environmental Protection Agency (EPA) grants (MM-98066401) and Bureau of Land Management (BLM) cost-share project (HWP00023). EPA previously provided funds for sampling Adams and Lincoln Counties as part of their Columbia Plateau Agricultural Initiative. BLM previously provided funds to characterize the their natural resource base in Lincoln County. DNR provided funds for sampling in southeastern Washington. Mike Marsh formerly of EPA initiated that agency's support for this project and deserves special recognition. Gary Devore, Adams County Conservation District, and Tom Platt, WSU Cooperative Extension-Lincoln County provided invaluable administrative and logistic support for inventory in their counties. Todd Thompson of the BLM has helped this project in shepherding funding through his agency and providing both sites and personal insights in the interpretation of stream and riparian function in the Columbia Basin. Calib Baldwin who collected plot and stream information in southeast Washington deserves special recognition.



INTRODUCTION

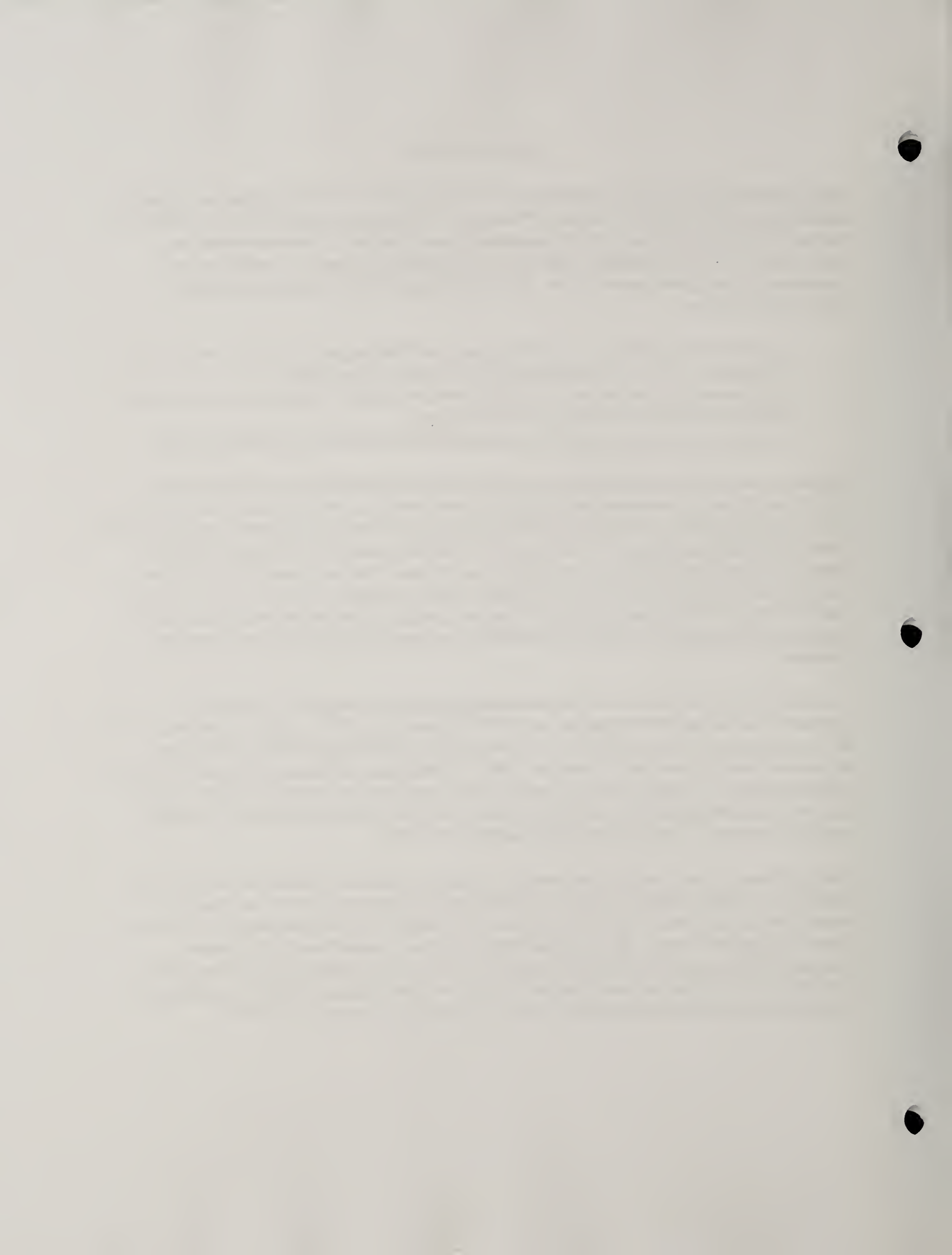
This report documents 3 years progress on an on-going project to develop a riparian vegetation classification for the Columbia Basin in Washington. Vegetation classifications of riparian and wetland systems provide integrated information systems that help in communication and interpretation of current land use, in definition of desired futures, and in comparison and monitoring for improving management. The final Columbia Plateau riparian vegetation classification will be:

1. a guide to the riparian and wetland vegetation of Washington's Columbia Basin with information on fluvial, geomorphological, and land use processes,
2. an information source on the relationship between riparian vegetation and water quality, runoff and habitat for wildlife and livestock, and
3. a riparian restoration and management guide and a baseline for monitoring change.

Riparian or streamside environments are critical linkages and transition zones between the upland and the aquatic environments. Riparian zones provide a variety of ecosystem functions, such as wildlife habitat, contribution to fish habitat, unique plant species habitat, improving flood control, and sediment trapping. Lowrance et al. (1985) documented how riparian vegetation controlled agricultural non-point-source pollution stressors to the environment. The riparian and wetland zone is vitally important to the livestock industry because it provides more and higher quality forage than the adjacent uplands. Improper grazing in riparian zones changes riparian vegetation and contributes to altered water quality, sediment flow and other environmental stressors.

Variability within the riparian zone has been recognized and cataloged by classifying its vegetation (Kovalchik 1987, Manning et al. 1996, Hansen et al. 1995). Each vegetation unit has its own characteristics and contributes in its own way to maintaining a healthy riparian and stream ecosystem (Crowe and Clausnitzer 1997). Classification of riparian vegetation in relation to fluvial surfaces in a particular watershed will give better targets for restoration or mitigation projects. Riparian vegetation classification in the county is currently limited and at a coarse scale (Cowardin et al. 1979, Evans 1989, Daubenmire 1970).

This preliminary classification of streamside vegetation is based on samples in the Cow, Crab, Douglas, and Foster Creek watersheds on the Columbia Basin proper, the lower reaches of creeks draining the Blue Mountains in southeast Washington and reconnaissance plots on Rock Creek in Klickitat County. The final classification will be compatible with the Federal Geographic Data Committee National Vegetation Classification standard (22 October 1997). Completion of a Columbia Basin Riparian Vegetation Classification is directly transferable to ongoing state and national vegetation classification efforts (Anderson et al. 1998).



METHODS

Sampling of riparian vegetation and its associated environment follows procedures for riparian characterization developed by a coalition of governmental and private organizations in Montana (Hansen et al. 1995), the forests of eastern Washington (Kovalchik 1992) and the rangeland and forests of northern Nevada (Manning and Padgett 1996). The inventory scheme is designed to sample across the variation in stream and riparian ecosystems (Reid and Bourgeron 1993).

Major drivers identified as determinants of riparian vegetation are valley gradient, geology, and landuse. Accurate or complete GIS covers of the latter factors were not available at the beginning of this project. The distribution of public land was assumed to capture the variation in geology and landuse across the county and was used as a surrogate for those factors. Public land combined with three valley gradient classes derived from a Department of Natural Resources hydrology layer were used to initially stratify sample locations.

Stream reaches sampled were first assessed as to their representativeness of the valley's disturbance history and hydrology. After a walking reconnaissance of the valley, a representative reach was selected for sampling and located on an orthophoto map. A preliminary horizontal map was sketched illustrating observed fluvial surfaces (Figure 1) with associated vegetation and land use.

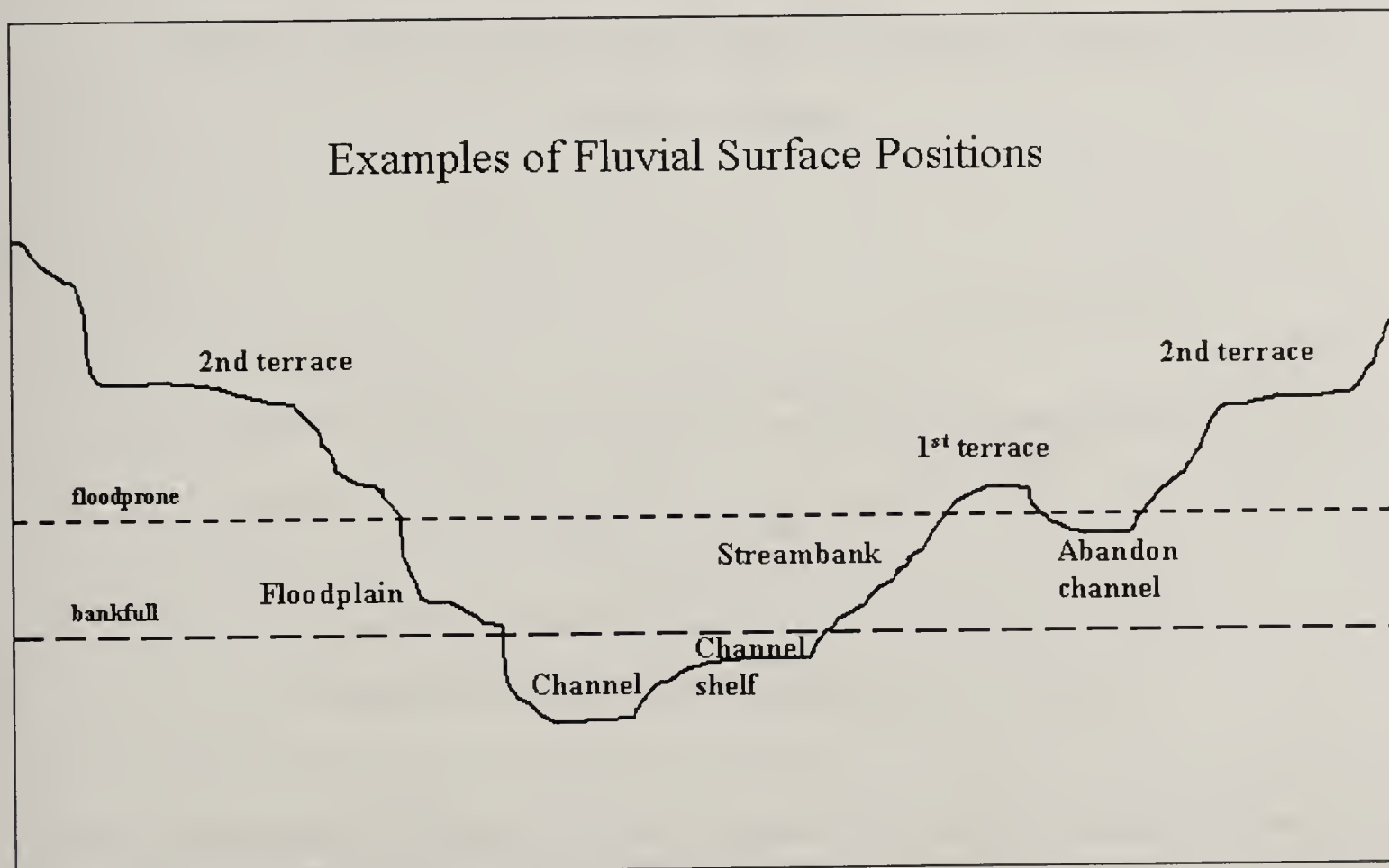


Figure 1. Illustration of relative positions of fluvial surfaces recorded for location of each vegetation plot.

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Using a modified Rosgen (1996) method of stream characterization, stream, valley, and environmental features were recorded and a stream profile was drawn to display the relationship of surfaces to field determined bankfull. The following information were collected at each stream reach: bankfull, bankfull width, average stream depth and maximum depth, floodprone width (measured at twice maximum depth from channel bottom), stream gradient, Rosgen stream type, influence of spring, seep, and sub-irrigation. Each stream was characterized as ephemeral, intermittent, or perennial as illustrated on recent USGS maps.

The following information was recorded to characterize each representative fluvial surface and its vegetation: 1) the distance from the channel at bankfull, 2) elevation above bankfull at plot center, 3) current land use, 4) thickness, texture and Munsel color of surface soil layers and where possible, characters of subsurface soil as to depth to redox layer, restrictive layer, or water table, and 5) a complete plant list by height class and species cover. Horizontal and vertical distances for stream profiles were determined by a tape measure and clinometer. Woody plants that can typically grow into a tree with single trunk over 5 inches diameter at 4.5 feet from the ground (DBH) were recorded as overstory trees and as understory trees when less than 5 inches DBH. Plot size for vegetation varied with size of dominant plants and size and shape of fluvial surface. Plot size in tree-dominated communities varied between .02 and .1 acre, .01 and .1 acre for shrublands and .001 and .1 acre for herbaceous vegetation.

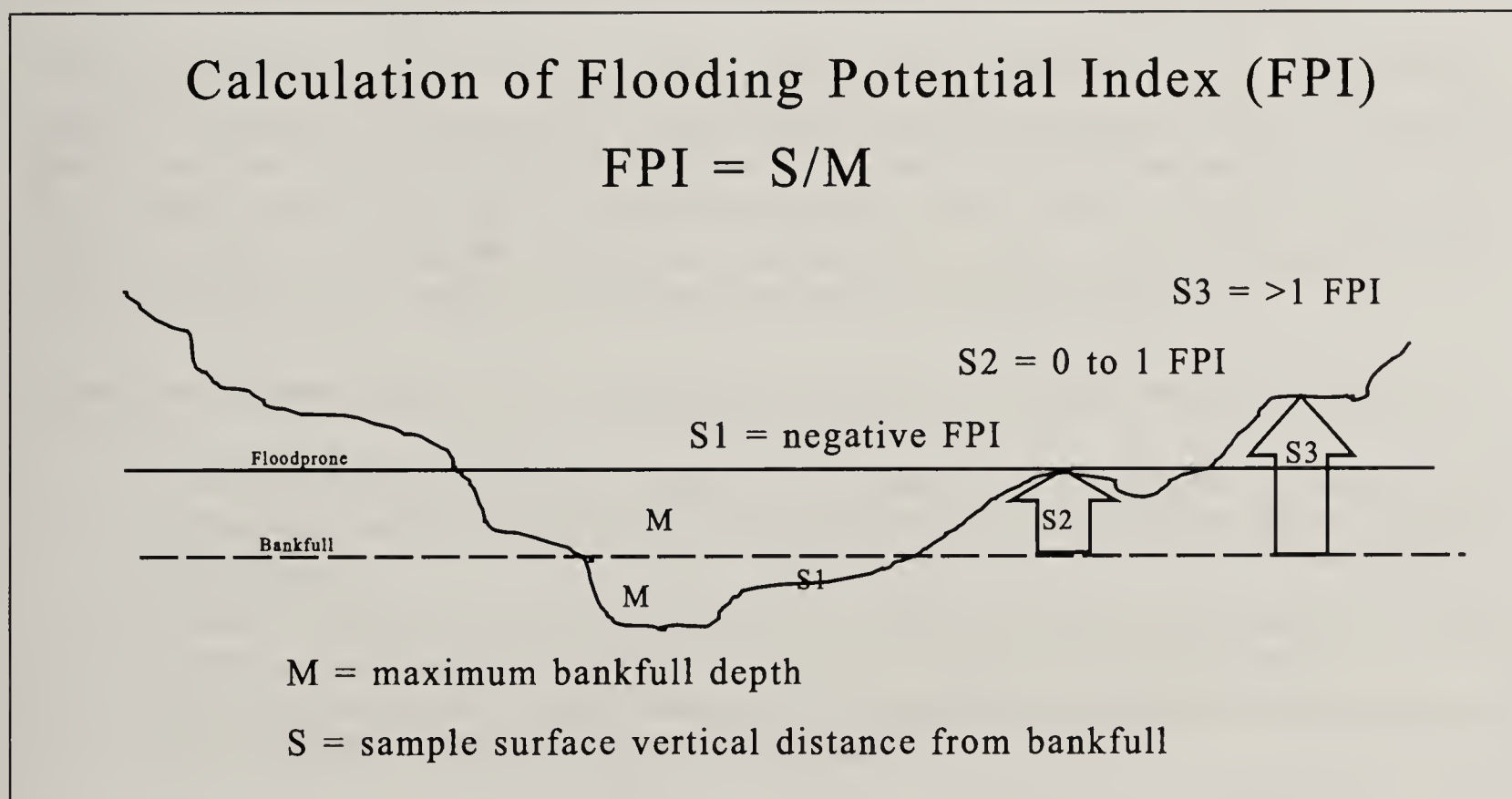


Figure 2. Stream measurements following Rosgen (1996) for field determined bankfull, which is the level of incipient flooding, and the floodprone zone defined as twice the maximum depth.

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Vegetation and site data were analyzed using TWINSpan and cluster analysis using the PC-ORD analytical package (McCune and Mefford 1997). Description and comparison of vegetation units with stream and site variables included deriving a Flooding Potential Index or FPI (Chappell 1999). FPI is calculated for each fluvial surface sampled by dividing its elevation above bankfull by maximum stream depth above bankfull (Figure 2). FPI places each site in a relative vertical position above the stream channel or relative to the floodprone area.

RESULTS AND DISCUSSION

Geologic setting. The Columbia Basin is underlain by 7 to 17 million year old basalt layers that fill a basin between the Cascade and Rocky Mountains. During the Pleistocene, 1 million to 10,000 years ago, glaciers covered the land north of most of the Columbia Basin. A lobe of that ice would sometimes dam a river in the northern Rockies (the Clark Fork River in Montana) and create a large lake that is now referred to as Lake Missoula. The ice dam formed and was breached or was broken-up as many as one hundred times, each time sending a torrent of water, ice and debris across the Columbia Basin Washington that eventually reached the Pacific Ocean through the Columbia River gorge. These catastrophic floods cut deep canyons and coulees in the basalt layers and deposited vast amounts of sand, gravel and boulders. The material sometimes partially filled canyons previously cut in the basalt. Finer material left after the floods were deposited in the Quincy and Pasco Basins. After the water receded and the sediments dried, they were blown northeastward to partially or completely cap exposed basalt and flood deposits with sand and silt. These wind blown deposits are now the deep, productive soils of the Palouse and adjacent areas (Alt and Hyndman 1984, Stoffel et al.1991).

Northern Douglas County is the only portion of the Columbia Plateau that was overridden by glaciers. This area at the edge of the Columbia River basalts additionally was also inundated by glacial meltwater lakes dammed up behind the Okanogan lobe of the continental glacier. The upper valley reaches are similar to other loess covered portions of the Columbia Basin except it is mixed with till. Additionally, underlying granodiorite is exposed near the Columbia River Canyon where it merges with the Okanogan river valley (Stoffel et al.1991).

Upland vegetation setting. The Columbia Basin supports a complex landscape composed of:

- 1) native shrubsteppe vegetation composed of scattered shrubs, typically sagebrush species or bitterbrush with a bunchgrass cover, usually bluebunch wheatgrass, Idaho fescue or needlegrasses,
- 2) scablands (shallow rocky soils) that support specialized vegetation dominated by stiff sagebrush, one of several bushy buckwheats, and short bunchgrasses, and
- 3) land largely converted to agricultural use or rangeland dominated by exotic plants or native vegetation tolerant of persistent land use.

Daubenmire (1970) describes the pre-agricultural vegetation landscape and Vander Haegen et al. (2000) describe the current landscape condition of the Columbia Basin of Washington.

Hydrologic setting. The Columbia Basin proper (the area bounded by the Columbia and Snake River canyons and the Rocky Mountain foothills) has four major watersheds: Crab Creek, Douglas Creek including McCartney Creek, and Foster Creek that all flow to the Columbia River

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and the Palouse River that flows to the Snake River. The Palouse River drains the foothills of the northern Rockies and the adjacent Columbia Basin plateau. Snowmelt and winter rain dominate the watershed. Cow Creek, a Palouse tributary, is the only part of that watershed sampled and the only part with significant dams, ditches and dikes.

Upper Crab Creek originates along the breaks above the Columbia River canyon in northeastern Spokane County and flows southwestward to Wilson Creek in Grant County. Upper Crab Creek is dominated by a multitude of springs, snowmelt and winter rain. From Wilson Creek, Crab Creek flows south into Moses Lake. Lower Crab Creek dominates the natural watershed of Grant County although the Columbia River Irrigation Project (CRIP) is the dominant hydrologic driver of much the county. Much of northern Grant County is the Grand Coulee, a major ice age flood channel that prior to CRIP supported a series of internally drained lakes. Today, Banks Lake reservoir is now at the head of Grand Coulee and provides water via a canal system to the irrigated agriculture landscape of central Grant County. Seepage from Banks Lake feeds the lakes south in Grand Coulee. Crab Creek and CRIP parallel each other and interact below Billy Clapp Reservoir. Wasteways (surface irrigation water re-entering the natural watershed) generally flow into narrow, steep valleys although they may be held as "pothole lakes" in broad flat valleys. These wasteway creeks have seasonal and daily flood patterns not found in native watersheds. Lower Crab Creek from Corfu to the Columbia River flows through a broad, flat valley with wasteway creeks entering along its north side.

Douglas and McCartney Creeks drain most of Douglas County southward through Moses Coulee into the Columbia River. Snowmelt, winter rain and springs dominate this watershed. Upper Douglas Creek is not dammed although it is confined within its narrow valley by railroad and road grades and is ditched in the lower reaches. The western portion of the watershed drains Badger Mountain, a local up-lift of Grande Ronde basalt. Generally, upper reaches of the Badger Mountain watershed are in steep gradient, narrow valleys while the lower reaches are in narrow, mid to low gradient valleys before joining the mainstem of Douglas Creek. Although McCartney Creek drains Jameson Lake, the only portions that have surface water are spring-fed. Douglas Creek recently has experienced a series of rain-on-snow flash flood events that scoured the much of the creek's flood plain.

Foster Creek drains northern Douglas County, the only glaciated portion of the Columbia Plateau, and flows north into the Columbia River. Snowmelt, winter rain and springs dominate this watershed. It is not dammed and comparatively only a few reaches are ditched or diked. The upper valley reaches are similar to other loess covered portions of the Columbia Basin except it is mixed with till. The mid reaches flow through generally broad low gradient valleys with Pleistocene lake deposits. The lower reaches are in narrower, steeper valleys cutting through a mix of exposed deep gravelly flood deposits and exposed granodiorite near the Columbia River Canyon where the Okanogan river valley merges.

Watersheds that originate in the Blue Mountains and the east Cascades and flow through the arid Columbia Basin into the Snake and Columbia Rivers are dominated by snowmelt although spring reaches are not uncommon.

Land Use Setting. Dryland farming and irrigation agriculture and hay production are primarily found on deep fine textured soils across the basin. The vast majority of those soil types are in

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agricultural use. The rest of the basin, primarily shallow or rocky soils, supports or was used to support livestock. Population centers are generally small and typically associated with water features, for example, Moses Lake and the tri-cities on the Columbia River.

Riparian Species List and Species Characteristics. Table 1 lists vascular plant species commonly encountered during vegetation sampling (>5% of plots or indicator value) by their lifeform, native or introduced status, and U.S. F.W.S. Region 9 hydrologic status. A total of 445 species were included in all samples. Common and scientific names are those listed in the U.S.D.A. Plants Database (<http://plants.usda.gov/plants>). Synonyms used in Hitchcock and Cronquist (1973) appear in Table 1. Table 2 lists the erosion control potential, short-term and long-term revegetation ability, forage for cattle, and potential to provide cover for mule deer, upland game birds, and waterfowl for selected species. Sources for this information are Hansen et al. (1995) and Crowe and Clausnitzer (1997).

Riparian Vegetation Classification. Analysis of vegetation and environmental data from 273 plots in 97 riparian settings derived 62 vegetation types (Figure 3). These are existing vegetation types and they are related to potential vegetation types when information is available.

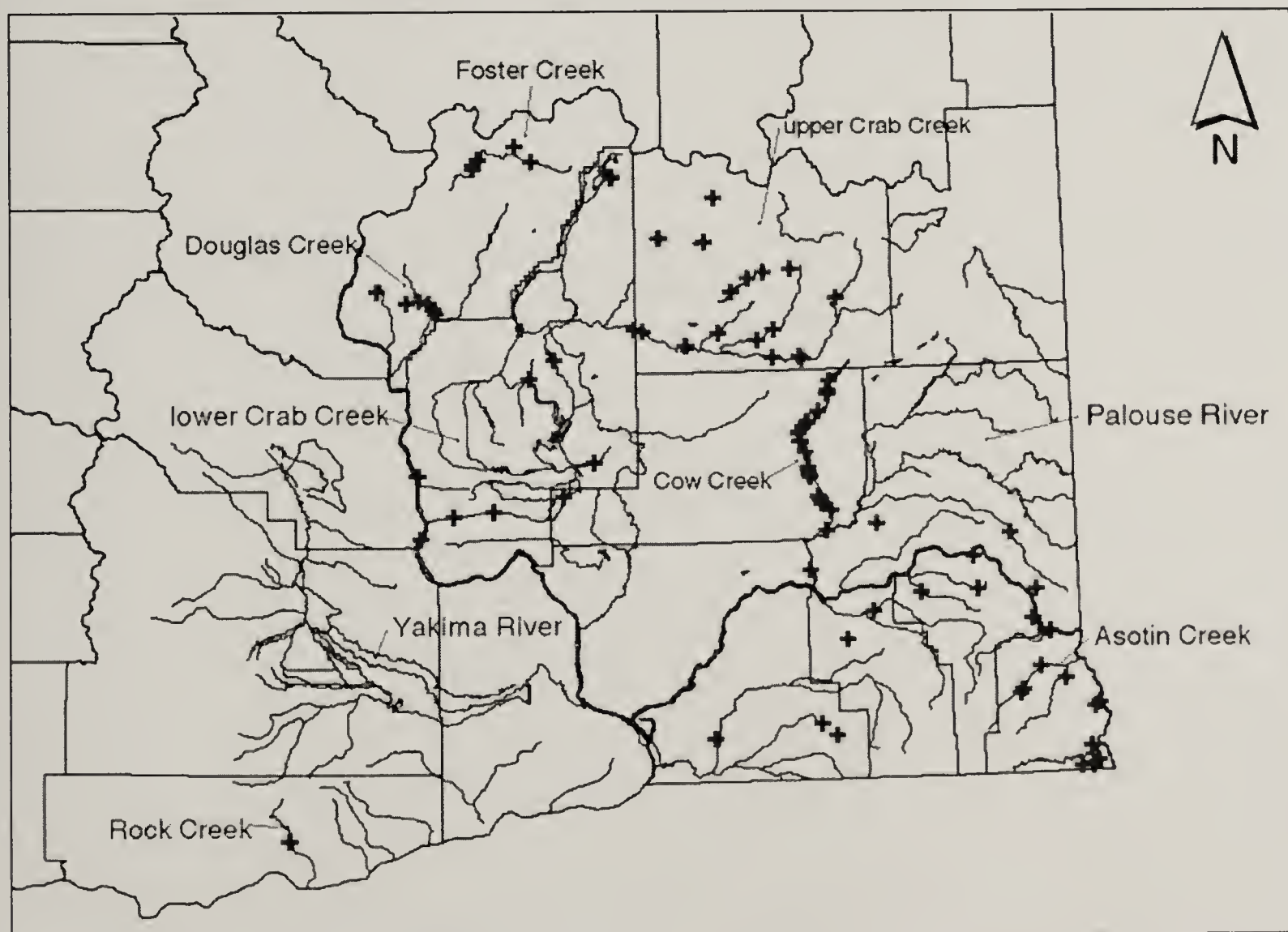


Figure 3. Distribution of sample reaches (+) and major drainages of the Columbia Basin, Washington.

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Each type is briefly described including its geographic distribution, fluvial setting, vegetation, and previous classification including its affinity to the existing national vegetation classification or NVC (Anderson et al. 1998), and sources of management recommendations. A vertical stream profile illustrates the relationship between fluvial surface and plant community type. Fluvial surfaces are depicted in relation to field determined bankfull and the floodprone zone as defined by Rosgen (1996). Each profile indicates the measured distance of each surface above and below bankfull and its horizontal width. Each description lists: 1) common plants in the community type with average cover and constancy or percent of plot they occurred in, and 2) environmental features of the type.

Types are grouped first by dominant lifeform: tree-, shrub-, grass and grass-like- and forb-dominated. Within the physiognomic groups types are clustered by a unifying characteristic, for example, salt meadow types or types with redosier dogwood. Common plant and environmental features tables list the groupings of types.

Plot numbers are listed with the community type description. Plots number is a combination of a sample reach number, plus the number of each sample at that location. For example, sample reach location 99RC10 had three samples: 99RC100 the unvegetated channel, 99RC101 reed canarygrass at bankfull, and 99RC102 an aspen stand on a second terrace.

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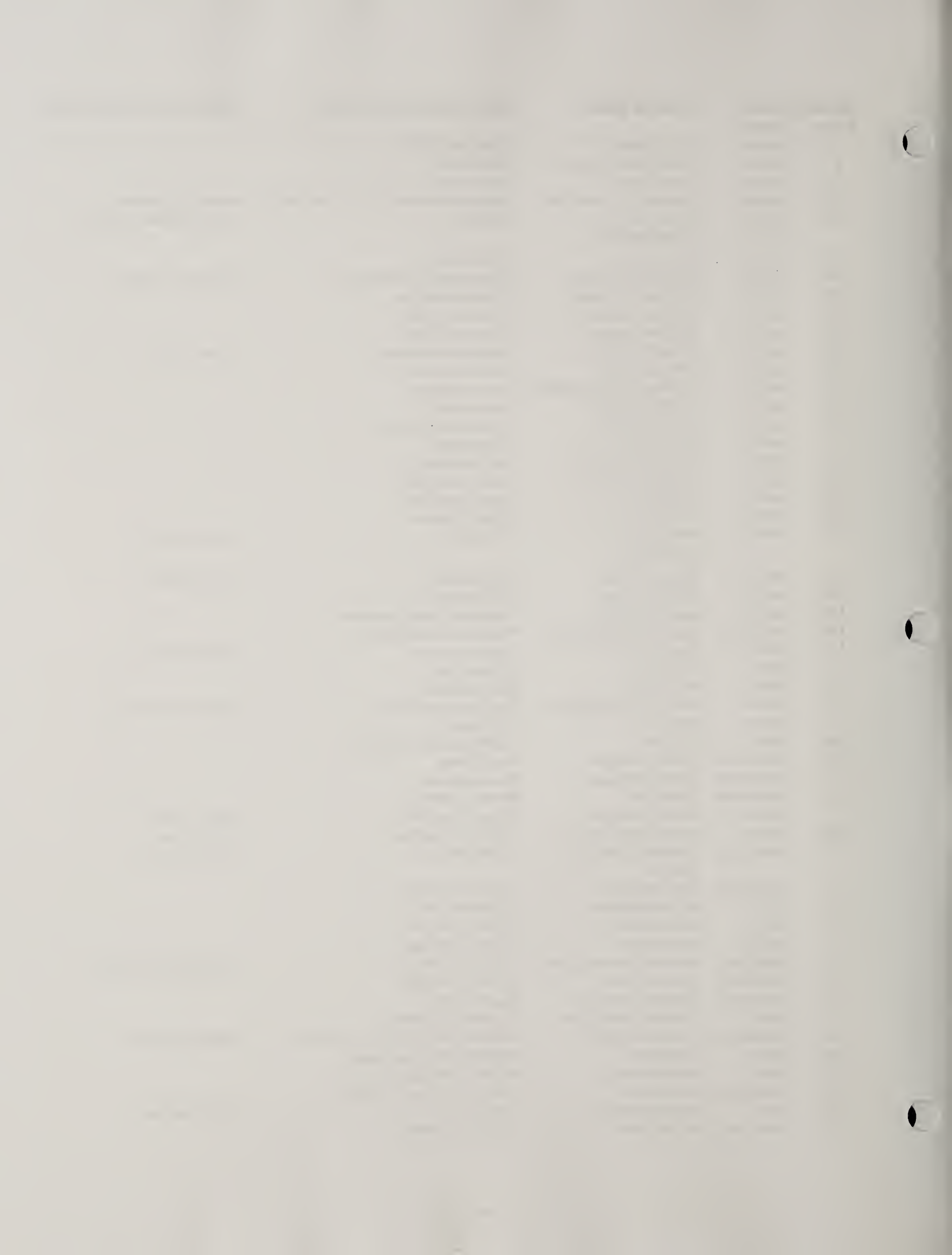
Table 1. Species names and riparian/wetland characteristics.

Wetland Status from U.S. F.W.S. OW = obligate wetland species that always occur in wetlands; FW =Facultative Wetland species that 67-99% of the time occur in wetlands; F = Facultative species that 34-67% occur in wetlands or uplands; FU = Facultative Upland species that 1-33% occur in wetlands; U = Obligate Uplands species that always in uplands.

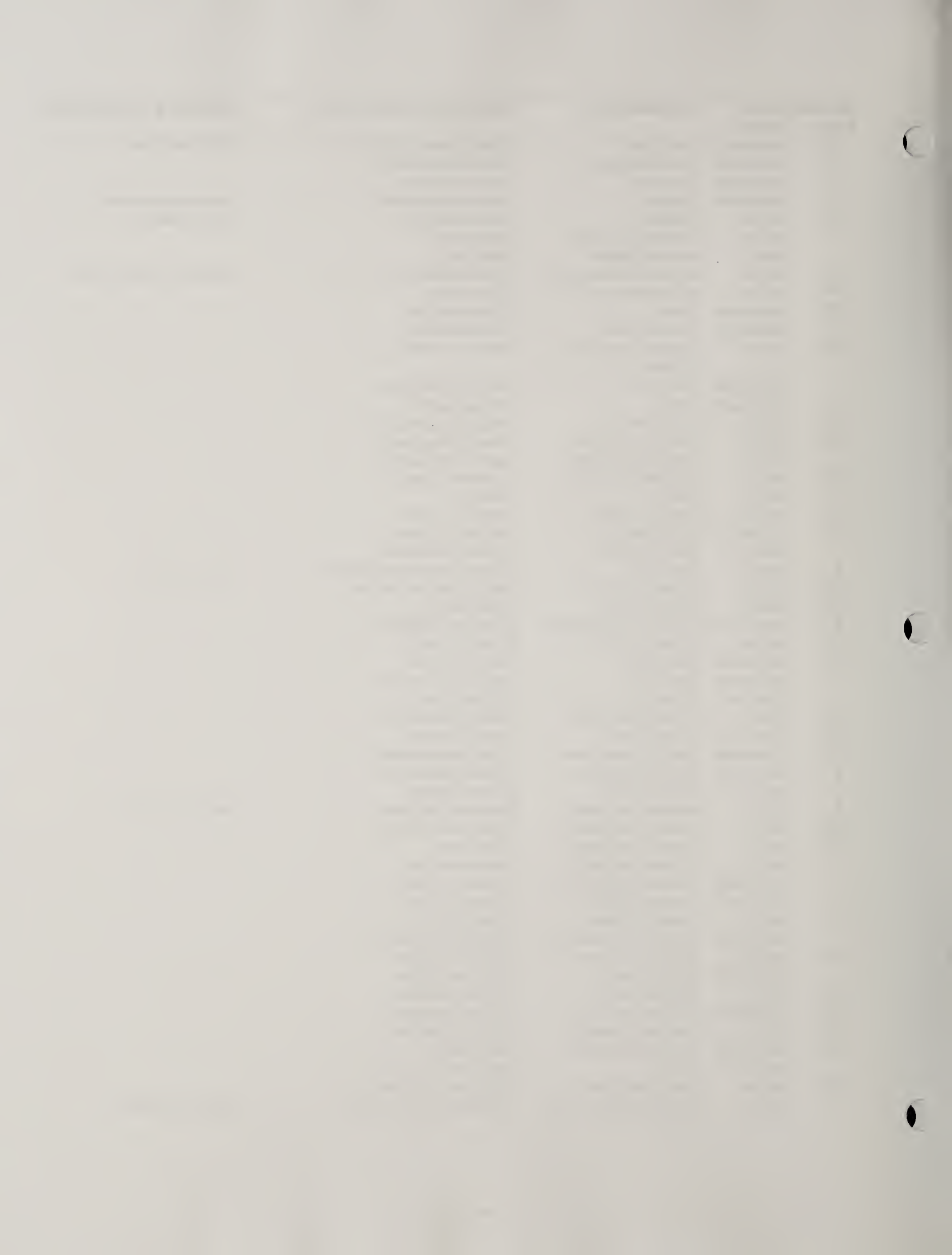
Wetland Status	Native Status	Common names	USDA Plants Database Name	Hitchcock & Cronquist 1973
TREES				
F	native	bigleaf maple	Acer macrophyllum	
F	native	black cottonwood	Populus balsamorrhiza ssp. trichocarpa	Populus trichocarpa
F	native	black hawthorn	Crataegus douglasii	
-	introduced	black walnut	Juglans nigra	
FW	introduced	boxelder	Acer negundo	
FU	native	common chokecherry	Prunus virginiana	
-	native	greenleaf willow	Salix lucida ssp. caudata	Salix lasiandra ssp. caudata
F	introduced	honey locust	Gleditsia triacanthos	
F	native	netleaf hackberry	Celtis laevigata var. reticulata	Celtis reticulata
FU	native	Oregon white oak	Quercus garryana	
FW	native	peachleaf willow	Salix amygdaloides	
FU	native	ponderosa pine	Pinus ponderosa	
FW	native	quaking aspen	Populus tremuloides	
F	introduced	Russian olive	Elaeagnus angustifolia	
FW	native	thinleaf alder	Alnus incana ssp. tenuifolia	Alnus incana
FW	native	water birch	Betula occidentalis	
FW	native	white alder	Alnus rhombifolia	
FW	introduced	white willow	Salix alba	
SHRUBS				
FU	native	Basin big sagebrush	Artemisia tridentata ssp. tridentata	Artemisia tridentata
FW	native	Bebb willow	Salix bebbiana	
F	native	blue elderberry	Sambucus nigra ssp. cerulea	
-	native	California blackberry	Rubus ursinus	
FU	native	common snowberry	Symphoricarpos albus	
-	introduced	dog rose	Rosa canina	
F	native	golden currant	Ribes aureum	
FU	native	greasewood	Sarcobatus vermiculatus	
FU	native	heath goldenrod	Ericameria nauseosa ssp.nauseosa var. nauseosa	Chrysothamnus nauseosus
F	native	Lewis' mockorange	Philadelphus lewisii	
FW	native	white sagebrush	Artemisia ludoviciana	
FU	native	Nootka rose	Rosa nutkana	
-	native	mallowleaf ninebark	Physocarpus malvaceous	
-	native	oceanspray	Holodiscus discolor	
FU	native	parsnipflower buckwheat	Eriogonum heracleoides	
-	native	Pursh's buckthorn	Frangula purshiana	Rhamnus purshiana
FW	native	redosier dogwood	Cornus sericea	Cornus stolonifera
OW	native	sandbar willow	Salix exigua	
FU	native	Saskatoon serviceberry	Amelanchier alnifolia	
F	native	Scouler's willow	Salix scouleriana	
FU	native	snow buckwheat	Eriogonum niveum	
FU	native	thimbleberry	Rubus parviflorus	
-	native	wax current	Ribes cereum var. cereum	
F	native	wedgeleaf saltbrush	Atriplex truncata	
FW	native	western poison ivy	Toxicodendron rydbergii	Rhus radicans
FU	native	western white clematis	Clematis ligusticifolia	



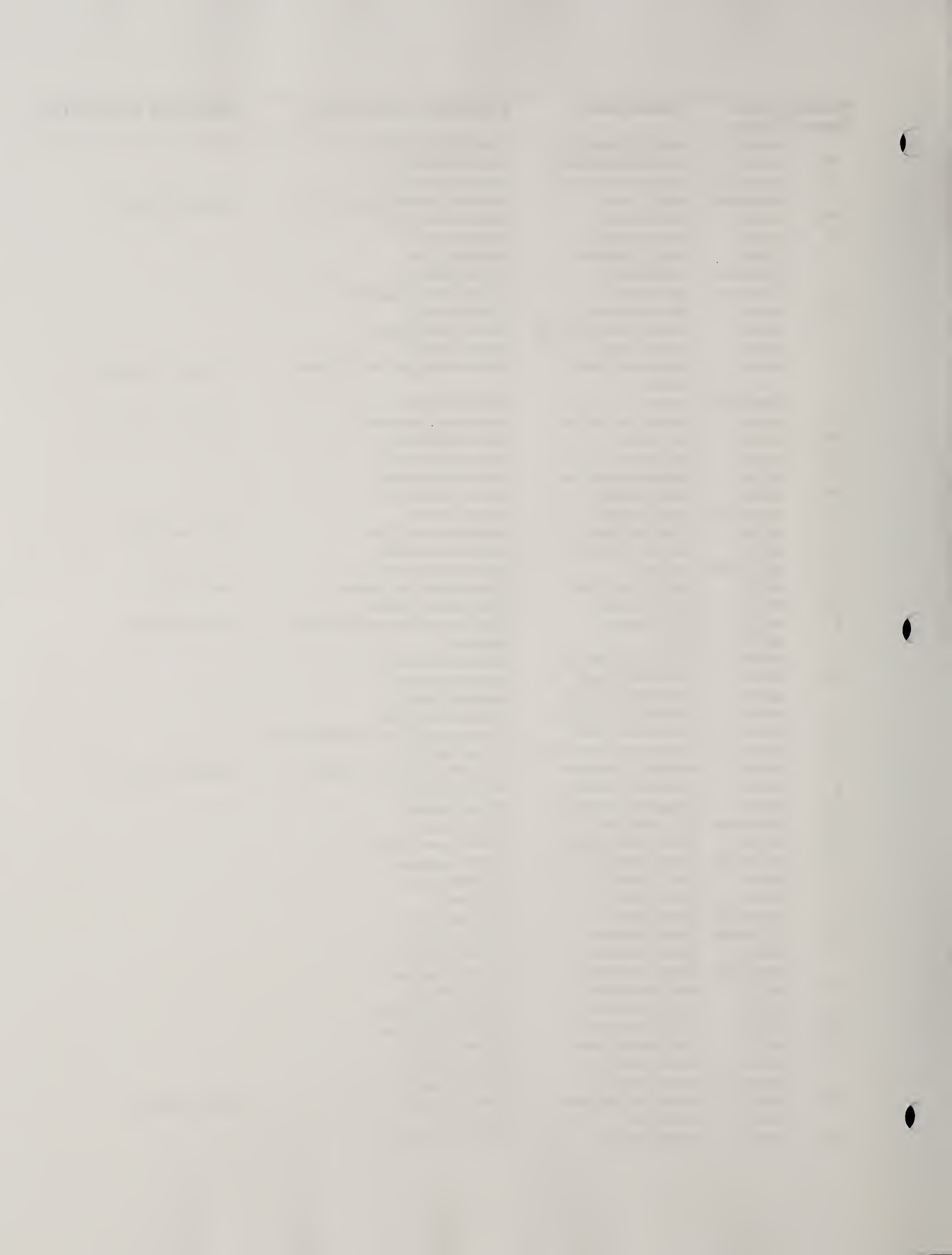
Wetland Status	Native Status	Common names	USDA Plants Database Name	Hitchcock & Cronquist 1973
-	native	white spirea	<i>Spiraea betulifolia</i>	
F	native	whitestem gooseberry	<i>Ribes inerme</i>	
FU	native	Woods' rose	<i>Rosa woodsii</i>	
FU	native	Wyoming big sagebrush	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	<i>Artemisia tridentata</i>
OW	native	yellow willow	<i>Salix lutea</i>	<i>Salix rigida</i> var. <i>watsonii</i>
GRAMINOIDS				
OW	native	Baltic rush	<i>Juncus balticus</i>	
OW	native	chairmaker's bulrush	<i>Schoenoplectus americanus</i>	<i>Scirpus americanus</i>
FW	native	clustered field sedge	<i>Carex praegracilis</i>	
OW	native	common spikerush	<i>Eleocharis palustris</i>	
OW	native	fewflower sedge	<i>Carex pauciflora</i>	
OW	native	hardstem bulrush	<i>Schoenoplectus acutus</i>	<i>Scirpus acutus</i>
OW	native	Nebraska sedge	<i>Carex nebrascensis</i>	
OW	native	Northwest Territory sedge	<i>Carex utriculata</i>	
OW	native	owlfruit sedge	<i>Carex stipita</i>	
OW	native	panicled bulrush	<i>Scirpus microcarpus</i>	
F	native	poverty rush	<i>Juncus tenuis</i>	
FW	native	slenderbeak sedge	<i>Carex athrostachya</i>	
FW	native	swordleaf rush	<i>Juncus ensifolius</i>	
OW	native	tapertip rush	<i>Juncus acuminatus</i>	
FW	native	toad rush	<i>Juncus bufonius</i>	
OW	native	woolly sedge	<i>Carex pellita</i>	<i>Carex lanuginosa</i>
GRASSES				
FU	native	alkali bluegrass	<i>Poa secunda</i>	<i>Poa juncifolia</i>
FW	native	alkali cordgrass	<i>Spartina gracilis</i>	
FW	native	annual hairgrass	<i>Deschampsia danthonioides</i>	
FW	introduced	annual rabbitsfoot grass	<i>Polypogon monspeliensis</i>	
FU	native	basin wildrye	<i>Leymus cinereus</i>	<i>Elymus cinereus</i>
-	both	bentgrass	<i>Agrostis</i> spp	
FU	native	blue wildrye	<i>Elymus glaucus</i>	
U	native	bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	<i>Agropyron spicatum</i>
-	native	bluegrass	<i>Poa</i> species	
FW	native	bluejoint	<i>Calamagrostis canadensis</i>	
FU	introduced	bulbous bluegrass	<i>Poa bulbosa</i>	
F	introduced	Canada bluegrass	<i>Poa compressa</i>	
FU	introduced	cheatgrass	<i>Bromus tectorum</i>	
F	introduced	colonial bentgrass	<i>Agrostis capillaris</i>	<i>Agrostis tenuis</i>
FW	native	creeping bentgrass	<i>Agrostis stolonifera</i>	<i>Agrostis alba</i>
F+	introduced	Darbyshire meadow ryegrass	<i>Lolium pratense</i>	<i>Festuca pratensis</i>
F	introduced	dense silkybent	<i>Agrostis interrupta</i>	
OW	native	fowl mannagrass	<i>Glyceria striata</i>	
F	native	foxtail barley	<i>Hordeum jubatum</i>	
U	native	Idaho fescue	<i>Festuca idahoensis</i>	
FW	introduced	intermediate wheatgrass	<i>Elytrigia intermedia</i>	<i>Agropyron intermedium</i>
U	introduced	Japanese brome	<i>Bromus japonicus</i>	
FU	introduced?	Kentucky bluegrass	<i>Poa pratensis</i>	
F	native	Lemmon's alkaligrass	<i>Puccinellia lemmonii</i>	
FW	introduced	leporinum barley	<i>Hordeum murinum</i> ssp. <i>leporinum</i>	<i>Hordeum lepidum</i>
FW	native	mat muhly	<i>Muhlenbergia richardsonis</i>	
FW	native	meadow barley	<i>Hordeum brachyantherum</i>	
FU	introduced	medusahead	<i>Taeniatherum caput-medusae</i>	
FU	native	Nevada bluegrass	<i>Poa secunda</i>	<i>Poa nevadensis</i>
FU	introduced	orchardgrass	<i>Dactylis glomerata</i>	



Wetland Status	Native Status	Common names	USDA Plants Database Name	Hitchcock & Cronquist 1973
FU	introduced	quackgrass	Elytrigia repens var. repens	Agropyron repens
FW	introduced?	reed canarygrass	Phalaris arundinacea	
U	introduced	rye brome	Bromus secalinus	
FU	introduced	ryegrass	Lolium arundinaceum	Festuca arundinaceum
FW	native	saltgrass	Distichlis spicata	Distichlis stricta
U	native	Sandberg bluegrass	Poa secunda	
-	both	six-week fescues	Vulpia spp.	
FU	native	streambank wheatgrass	Elymus lanceolatus	Agropyron dasystachyum
FW	native	tall mannagrass	Glyceria elata	
FU	introduced	timothy	Phleum pratense	
U	introduced	ventenatagrass	Ventenata dubia	
OW	native	weeping alkaligrass	Puccinellia distans	
FORBS				
-	introduced	absinthium	Artemisia absinthium	
-	introduced	alfalfa	Medicago sativa	
OW	native	alkali buttercup	Ranunculus cymbalaria	
OW	native	American speedwell	Veronica americana	
-	native	arrowleaf balsamroot	Balsamorhiza sagittata	
OW	native	arumleaf arrowhead	Sagittaria cuneata	
-	native	aster	Aster sp.	
FU	native	bigbract verbena	Verbena bracteosa	
F	introduced	black medick	Medicago lupulina	
-	native	blue eyed Mary	Collinsia grandiflora	
F	native	blue lettuce	Lactuca tatarica var. pulchella	Lactuca pulchella
OW	native	broadfruit burreed	Sparganium eurycarpum	
OW	native	broadleaf cattail	Typha latifolia	
F	introduced	broadleaved pepperweed	Lepidium latifolium	
FW	native	brook cinquefoil	Potentilla rivalis	
FU	introduced	bull thistle	Cirsium vulgare	
-	introduced	burr chervil	Anthriscus scandicina	
-	unknown	buttercup	Ranunculus sp.	
FU	native	Canada goldenrod	Solidago canadensis	
FU	introduced	Canadian thistle	Cirsium arvense	
FU	introduced	clasping pepperweed	Lepidium perfoliatum	
F	introduced	climbing nightshade	Solanum dulcamara	
-	native	coastal manroot	Marah oreganus	
F	native	common cowparsnip	Heracleum maximum	Heracleum lanatum
FU	native	common dandelion	Taraxacum officinale	
OW	native	common duckweed	Lemna minor	
-	native	common gaillardia	Gaillardia aristata	
-	introduced	common motherwort	Leonurus cardiaca	
-	introduced	common mullein	Verbascum thapsus	
F	native	common plantain	Plantago major	
-	introduced	common St. Johnswort	Hypericum perforatum	
FU	native	common sunflower	Helianthus annuus	
-	introduced	common tansy	Tanacetum vulgare	
FU	native	common yarrow	Achillea millefolium	
FW	introduced	creeping buttercup	Ranunculus repens	
FU	native	curlycup gumweed	Grindelia squarrosa	
OW	introduced	cutleaf waterparsnip	Berula erecta	
-	native	dock	Rumex sp.	
OW	native	dotted smartweed	Polygonum punctatum	
F	native	feathery false lily of the valley	Maianthemum racemosum	Smilacina racemosa



Wetland Status	Native Status	Common names	USDA Plants Database Name	Hitchcock & Cronquist 1973
-	native	fernleag biscuitroot	Lomatium dissectum	
FU	native	fiddleleaf hawksbeard	Crepis runcinata	
FW	introduced	fivehorn smotherweed	Bassia hyssopifolia	
-	introduced	Fuller's teasel	Dipsacus fullonum ssp.sylvestris	Dipsacus sylvestris
FW	native	giant horsetail	Equisetum telmateia	
F	native	giant sumpweed	Iva xanthifolia	
-	native	Gray's biscuitroot	Lomatium grayi	
-	unknown	groundsmoke	Gayophytum sp.	
-	introduced	gypsyflower	Cynoglossum officinale	
OW	native	hairy pepperwort	Marsilea vestita	
-	native	harlequin blue eyed Mary	Collinsia heterophylla	
-	native	heartleaf arnica	Arnica cordifolia	
-	native	Henderson inflated olsynium	Olsynium douglasii var. inflatum	Sisyrichium douglasii
-	introduced	hogbite	Chondrilla juncea	
F	native	intermediate dogbane	Apocynum X floribundum	Apocynum medium
FW	native	jewelweed	Impatiens capensis	
F	native	lambsquarters	Chenopodium album	
F	native	lambtongue ragwort	Senecio integerrimus	
FW	native	largeleaf avens	Geum macrophyllum	
-	introduced	lesser burdock	Arctium minus	
-	native	littleflower gilia	Ipomopsis minutiflora	Gilia minutiflora
OW	native	Macoun's buttercup	Ranunculus macounii	
-	introduced	madwort	Asperugo procumbens	
F	native	manyflowered aster	Aster ericoides var. pansus	Aster pansus
OW	native	marsh skullcap	Scutellaria galericulata	
F	native	miner's lettuce	Claytonia perfoliata ssp.perfoliata	Montia perfoliata
-	native	mint	Mentha sp.	
-	native	Munro's globemallow	Sphaeralcea munroana	
OW	native	narrowleaf cattail	Typha angustifolia	
-	native	needleleaf navarretia	Navarretia intertexta	
F	native	nettleleaf giant hyssop	Agastache urticifolia	
-	native	northern bog violet	Viola nephrophylla var. nephrophylla	
OW	native	northern marsh yellowcress	Rorippa islandica	
-	native	northern willowherb	Epilobium ciliatum ssp. watsonii	Epilobium watsonii
F	native	northwest cinquefoil	Potentilla gracilis	
FW	native	Oregon checkermallow	Sidalcea oregana	
OW	introduced	paleyellow iris	Iris pseudacorus	
FU	native	Pennsylvania pellitory	Parietaria pennsylvanica	
FW	introduced	poison hemlock	Conium maculatum	
-	native	popcornflower	Plagiobothrys sp.	
F	native	povertyweed	Iva axillaris	
F	introduced	prickly lettuce	Lactuca serriola	
OW	introduced	purple loosestrife	Lythrum salicaria	
F+	native	purple sweetroot	Osmorhiza purpurea	
-	introduced	redstem stork's bill	Erodium cicutarium	
FW	native	Rocky Mountain iris	Iris missouriensis	
F	native	rough cockleburr	Xanthium strumarium	
OW	native	seaside arrowgrass	Triglochin maritimum	
OW	native	seep monkeyflower	Mimulus guttatus	
F	native	showy milkweed	Asclepias speciosa	
F	introduced	silver cinquefoil	Potentilla argentea	
OW	native	silverweed cinquefoil	Argentina anserina	Potentilla anserina
-	unknown	smartweed	Polygonum sp.	
FW	native	smooth horsetail	Equisetum laevigatum	



Wetland Status	Native Status	Common names	USDA Plants Database Name	Hitchcock & Cronquist 1973
-	native	sowthistle	Sonchus sp.	
F	native	starry false Solomon's seal	Maianthemum stellatum	Smilacina stellata
FU	native	stickywilly	Galium aparine	
FW	native	stinging nettle	Urtica dioica	
OW	native	swamp smartweed	Polygonum hydropiperoides	
F	native	swamp verbena	Verbena hastata	
-	native	sweetcicely	Osmorhiza berteroi	Osmorhiza chilensis
-	introduced	sweetclover	Melilotus sp.	
FW	native	tall groundwel	Senecio hydrophiloides	Senecio foetidus
F	native	tall ragwort	Senecio serra	
-	native	tall tumbledustard	Sisymbrium altissimum	
-	native	tansyleaf eveningprimrose	Oenothera tanacetifolia	
-	native	tarweed fiddleneck	Amsinckia lycopsoides	
-	unknown	thistle	Cirsium spp.	
-	native	turpentine wavewing	Pteryxia terebinthina var. terebinthina	Cymopterus terebinthinus
-	native	violet	Viola sp.	
OW	native	water knotweed	Polygonum amphibium	
OW	native	water speedwell	Veronica anagallis-aquatica	
OW	introduced	watercress	Rorippa nasturtium-aquaticum	
FW	native	wedgescale saltbush	Atriplex truncata	
FW	native	western false dragonhead	Physostegia parviflora	Dracocephalum nuttallii
FW	native	western goldentop	Euthamia occidentalis	Solidago occidentalis
-	native	western gromwell	Lithospermum ruderales	
-	native	western tansymustard	Descurainia pinnata	
OW	native	western water hemlock	Cicuta douglasii	
FU	introduced	white clover	Trifolium repens	
F	native	whitetip clover	Trifolium variegatum	
-	introduced	whitetop	Cardaria draba	
OW	native	whitewater crowfoot	Ranunculus aquatilis	
F	native	wild mint	Mentha arvensis	
-	native	wild onion	Allium spp.	
FW	native	willow dock	Rumex salicifolius	
-	native	willowherb	Epilobium spp	
-	native	woolly eriophyllum	Eriophyllum lanatum	
-	native	woolly plantain	Plantago patagonica	
FU	introduced	wormseed wallflower	Erysimum cheiranthoides	
-	introduced	yellow salsify	Tragopogon dubius	
-	introduced	yellow sweetclover	Melilotus officinalis	

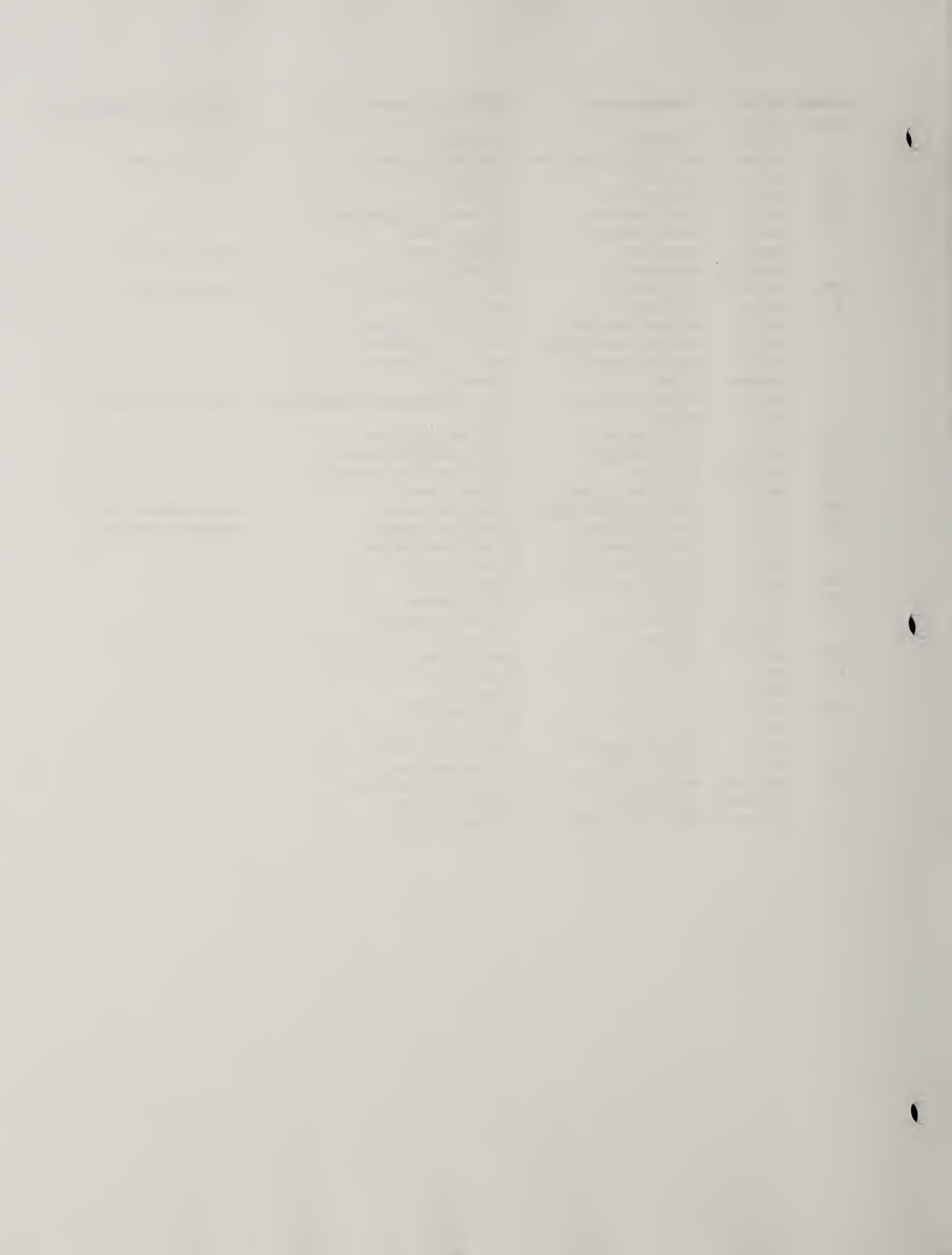


Table 2. Selected revegetation and habitat characteristics of riparian species.

Erosion control refers to species with a growth habitat that has the potential to reduce soil erosion. H = high potential species that are aggressive, persistent, high biomass and soil binding root/rhizome system, M = moderate potential species, L = low potential species that have poor growth form, persistence, biomass or root/rhizome system.

Short-term revegetation potential refers to species that quickly establish and grow within 1-3 years. H = high potential species that grow rapidly, provides good cover and reproduce quickly, M = moderate potential; L = low potential.

Long-term revegetation potential refers to species that establish in and persist for more than 3 years. H = high potential, M = moderate potential, L = low potential.

Cattle forage refers to palatability rated G = good, F = fair, P = poor.

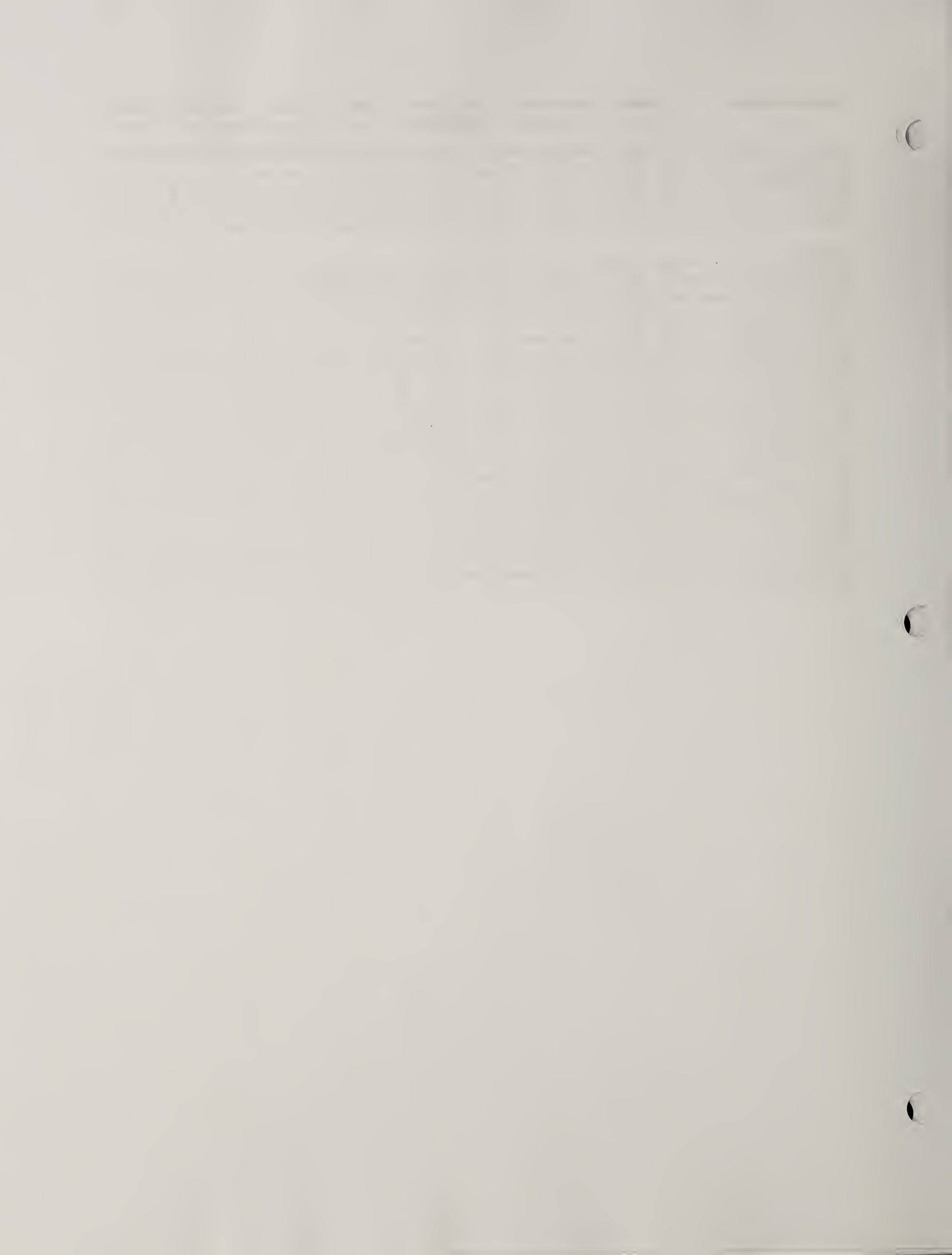
Cover refers to thermal or feeding cover for the wildlife group rated G = good, F = fair, P = poor. All ratings were taken from Hansen et al. (1995).

Common names	Erosion control	Short-term revegetation	Long-term revegetation	Cattle forage	Mule deer cover	Upland game birds cover	Waterfowl cover
TREES							
black cottonwood	H	L	M	P	F	F	F
black hawthorn	M	L	M	F	G	F	F
boxelder	M	L	L	P	G	G	P
common chokecherry	M	L	H	F	G	G	G
quaking aspen	H	L	H	F	G	G	F
peachleaf willow	H	L	M	F	G	G	F
water birch	H	L	M	P	G	G	G
white willow	H	L	M				
SHRUBS							
basin big sagebrush	L	L	L	L	L		
Bebb willow	H	L	M	G	G	G	F
common snowberry	M	L	M	F	F	G	G
greasewood	M	L	M	F	F	F	G
redosier dogwood	H	L	M	F	G	F	F
sandbar willow	H	L	M	F	G	G	G
Saskatoon serviceberry	M	L	M	F	F	F	G
western white clematis	M	L	L	P			
Woods' rose	H	L	M	F	G	F	G
yellow willow	H	L	M	F	G	G	F
GRAMINOIDS							
Baltic rush	M	L	M	F		F	G
common spikerush	H	H	M	P		F	G
Northwest Territory sedge	H	M	H			P	P
softstem bulrush	M	M	M	F	G	G	G
water sedge	H	M	M	G		P	F
woolly sedge	H	M	M	G		P	F
GRASSES							
alkali cordgrass	H	M	H	F	F	G	G
basin wildrye	H	M	H	G		F	G
blue wildrye	M	M	H	G			
bluejoint	H	L	H	G		P	G
creeping bentgrass	H	H	H	F		G	G
fowl mannagrass	M	L	M	G		F	G
foxtail barley	L	M	L	P		P	G
Idaho fescue	M	L	M	G			
Kentucky bluegrass	L	M	H	G		G	G

Common names	Erosion control	Short-term revegetation	Long-term revegetation	Cattle forage	Mule deer cover	Upland game birds cover	Waterfowl cover
quackgrass	H	M	H	G		G	G
reed canarygrass	H	M	H	G		F	G
saltgrass	M	L	M	F		P	P
timothy	M	M	H	G	G	F	G

FORBS

broadleaf cattail	H	L	H	P	F	G	G
Canada goldenrod	M	M	M	P			
Canadian thistle	M	L	M	P			
common cowparsnip	M	L	L	G			
common dandelion	L	L	L	F			
common horsetail	M	H	M	P	P	P	P
common yarrow	L	H	M	P			
largeleaf avens	L	L	L				
northwest cinquefoil	L	M	M	F			
seaside arrowgrass	L	L	L	P			
silverweed cinquefoil	M	M	M	F			
smooth horsetail	M	H	M	P			
starry false Solomon's seal	L	L	L	P			
stinging nettle	M	L	L	P			
water knotweed	M	M	M	F			
white clover	L	M	M	G			
yellow sweetclover	M	H	M	G		G	G



Key to riparian and wetland vegetation types of the Columbia Basin, Washington

This is a key to vegetation types associated with permanent, intermittent and ephemeral streams, ponds and lakes in the Columbia Basin in Washington. Types were either sampled during this project and/or have been documented in literature (see page 75). The key differs from more traditional dichotomous keys in that, it presents only the first couplet and does not always list the alternative choice. The listed choices are arranged hierarchically so that if a statement is not met then one proceeds to the next statement. As with all keys, this is an aid for identification, not the classification. Upland vegetation types occurring in streamside environments are not included.

Ponderosa pine (*Pinus ponderosa*) dominant tree and >25% cover

1. Common snowberry (*Symphoricarpos albus*) >10% cover.....*Pinus ponderosa* / *Symphoricarpos albus* floodplain Forest, page 81
2. Saskatoon serviceberry (*Amelanchier alnifolia*) >10% coverPonderosa pine / Saskatoon serviceberry (*Pinus ponderosa* / *Amelanchier alnifolia*) community, page 27

Quaking aspen (*Populus tremuloides*) dominant tree and >25% cover

1. Woolly sedge (*Carex lanuginosa*) >10% cover *Populus tremuloides* / *Carex lanuginosa* Forest, page 81
2. Redosier dogwood (*Cornus sericea*) >10% cover Quaking aspen / redosier dogwood (*Populus tremuloides* / *Cornus sericea*) association, page 23
3. Common snowberry (*Symphoricarpos albus*) >10% cover..... Quaking aspen / common snowberry (*Populus tremuloides* / *Symphoricarpos albus*) association, page 24
4. Black hawthorn (*Crataegus douglasii*) >10% cover and cowparsnip (*Heracleum maximum*) >10% cover..... (*Populus tremuloides*) - *Crataegus douglasii* / *Heracleum maximum* Shrubland, page 81

Black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) dominant tree and >25% cover

1. White alder (*Alnus rhombifolia*) >10% cover..... *Populus balsamifera* ssp. *trichocarpa* - *Alnus rhombifolia* Forest, page 81
2. Thinleaf alder (*Alnus incana*) >10% cover..... *Populus balsamifera* ssp. *trichocarpa* / *Alnus incana* Forest, page 81
3. Redosier dogwood (*Cornus sericea*) >10% cover *Populus balsamifera* ssp. *trichocarpa* / *Cornus sericea* Forest, page 81
4. Common snowberry (*Symphoricarpos albus*) >10% cover..... Black cottonwood / common snowberry (*Populus balsamifera* ssp. *trichocarpa* / *Symphoricarpos albus*) association, page 25
5. Sandbar willow (*Salix exigua*) >10% cover..... Black cottonwood/sandbar willow (*Populus balsamifera* ssp. *trichocarpa* / community, page 27
6. Rocky Mountain juniper (*Juniperus scopulorum*) >10% cover..... Black cottonwood-Rocky Mountain

[The page contains extremely faint, illegible text, likely bleed-through from the reverse side of the paper. The text is organized into several paragraphs and possibly a list or table, but the characters are too light to be transcribed accurately.]

juniper (*Populus balsamifera* ssp. *trichocarpa* - *Juniperus scopulorum*) community, page 27

7. Lewis' mockorange (*Philadelphus lewisii*) >10% cover..... Black cottonwood / mockorange (*Populus balsamifera* ssp. *trichocarpa* / *Philadelphus lewisii* community, page 27
8. Forb dominated understory
 - *Populus balsamifera* ssp. *trichocarpa* / *Cicuta douglasii* Forest, page 81
 - *Populus balsamifera* ssp. *trichocarpa* / *Equisetum hymenale* Forest, page 81

White alder(*Alnus rhombifolia*) dominant tree and >25% cover

1. Water birch (*Betula occidentalis*) >10% cover..... White alder/water birch association (*Alnus rhombifolia* / *Betula occidentalis*) association, page 28
2. Lewis' mockorange (*Philadelphus lewisii*) >10% cover..... White alder/mockorange (*Alnus rhombifolia* / *Philadelphus lewisii*) association, page 28
3. Netleaf hackberry (*Celtis occidentalis* var. *reticulata*) >10% cover.... White alder/netleaf hackberry (*Alnus rhombifolia* / *Celtis occidentalis* var. *reticulata*) association, page 28
- 4.

Oregon white oak (*Quercus garryana*) dominant tree and >25% cover

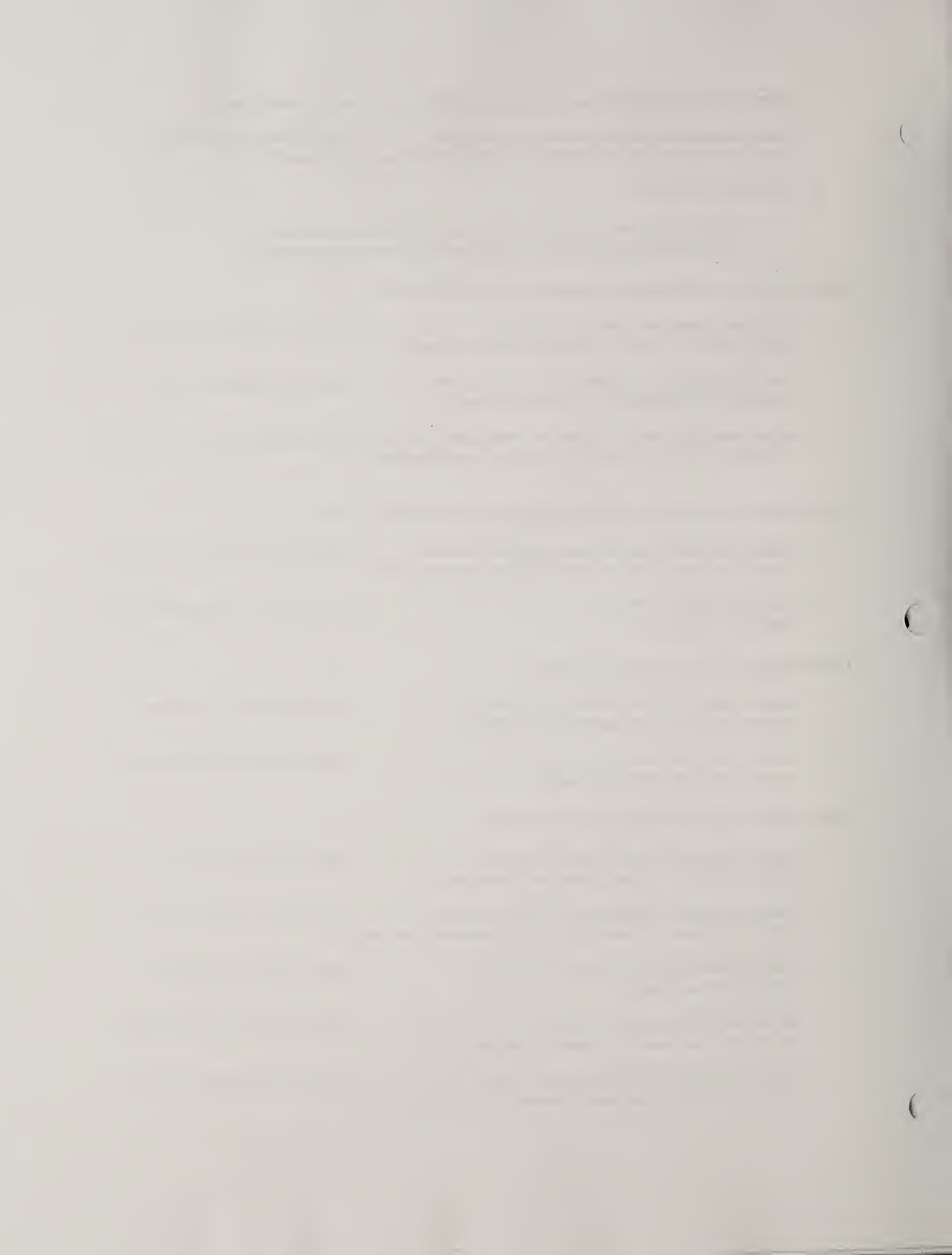
1. Common snowberry (*Symphoricarpos albus*) >10% cover..... Oregon white oak / common snowberry (*Quercus garryana* / *Symphoricarpos albus*) association, page 26
2. Common snowberry <10% cover..... *Quercus garryana* Temporarily Flooded Woodland, page 81

Thinleaf alder (*Alnus incana*) >25% cover

1. Redosier dogwood (*Cornus sericea*) >10% cover Thinleaf alder/redosier dogwood (*Alnus incana* / *Cornus sericea*) association, page 33
2. Yellow willow (*Salix lutea*)>10% coverThinleaf alder/yellow willow (*Alnus incana* / *Salix lutea*) community, page 48

Water birch (*Betula occidentalis*) >25% cover

1. Redosier dogwood (*Cornus sericea*) >10% cover Water birch / redosier dogwood (*Betula occidentalis* / *Cornus sericea*) association, page 34
2. Common snowberry (*Symphoricarpos albus*) >10% cover..... Water birch / Common snowberry (*Betula occidentalis* / *Symphoricarpos albus*) community type, page 35
3. Black hawthorn (*Crataegus douglasii*) >10% cover *Betula occidentalis* / *Crataegus douglasii* Shrubland, page 81
4. Woods' rose (*Rosa woodsii*) >10% cover..... Water birch / Woods' rose (*Betula occidentalis* / *Rosa woodsii*) community type, page 36
5. Lewis' mockorange (*Philadelphus lewisii*) >10% cover..... Water birch / mockorange (*Betula occidentalis* / *Philadelphus lewisii*) community type, page 48



Black hawthorn (*Crataegus douglasii*) >25% cover

1. Common snowberry (*Symphoricarpos albus*) >10% cover..... Black hawthorn / common snowberry (*Crataegus douglasii* / *Symphoricarpos albus*) association , page 37
2. Woods' rose (*Rosa woodsii*) >10% cover.....Black hawthorn / Woods' rose (*Crataegus douglasii* / *Rosa woodsii*) community type, page 38

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- Common chokecherry (*Prunus virginiana*) community type, page 48

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- *Salix lucida* ssp. *caudata* Shrubland [Provisional], page 81

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1. Redosier dogwood (*Cornus sericea*) >10% cover Yellow willow/ redosier dogwood (*Salix lutea* / *Cornus sericea*) association, page 41
2. Sandbar willow (*Salix exigua*) >10% cover.....Yellow willow - Sandbar willow (*Salix lutea* – *S. exigua*) association, page 42

Sandbar willow (*Salix exigua*) >10% cover

- Sandbar or coyote willow (*Salix exigua*) association, page 42
- *Salix exigua* / *Equisetum arvense* Shrubland, page 81
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White willow (*Salix alba*) >25% cover

- White willow (*Salix alba*) community, page 49
-

Boxelder (*Acer negundo*) >25% cover

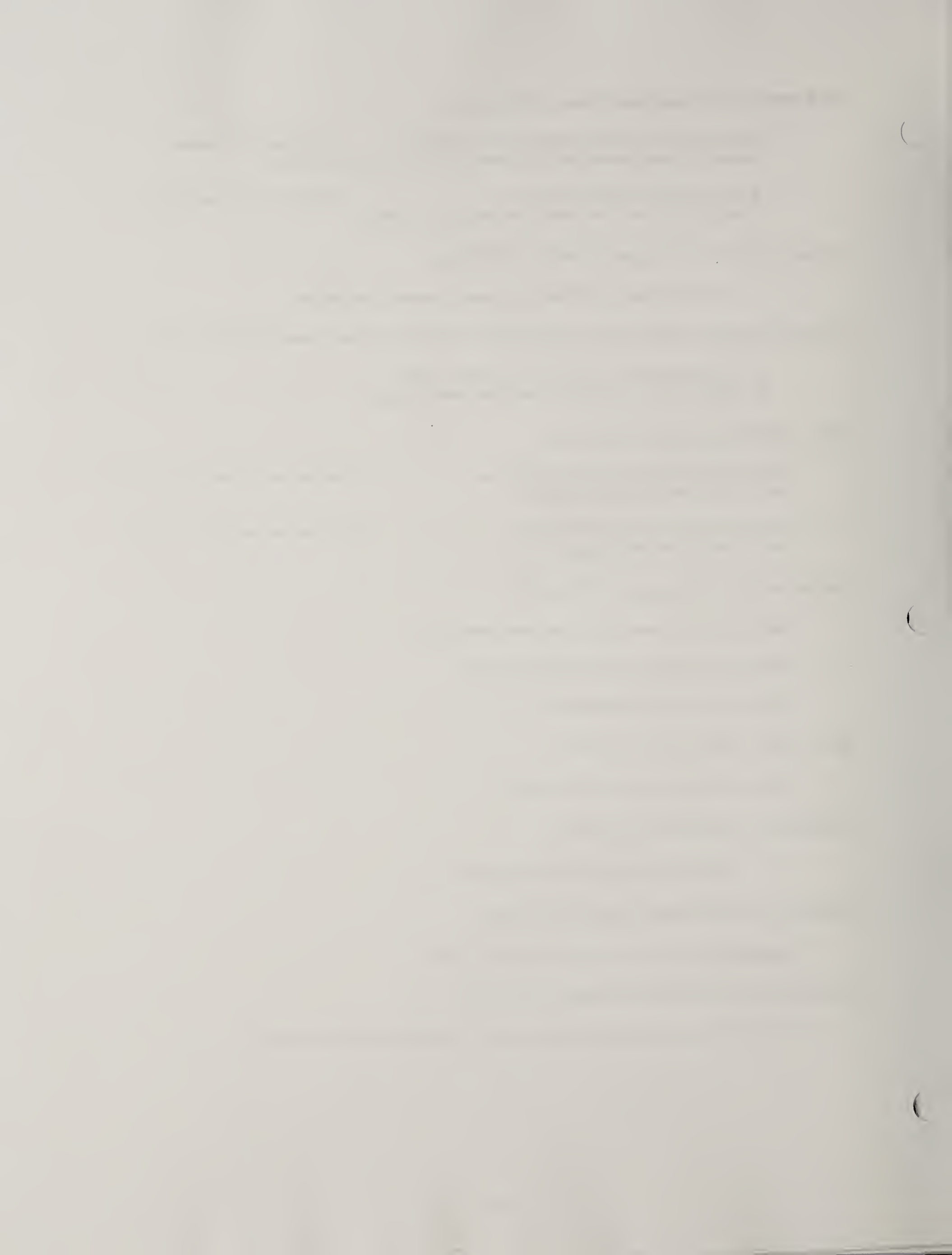
- Boxelder (*Acer negundo*) community, page 49

Redosier dogwood (*Cornus sericea*) >25% cover

- Redosier dogwood (*Cornus sericea*) association, page 40

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- Woods' or Nootka rose community (*Rosa woodsii* or *R. nutkana*) community, page 39



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- Netleaf hackberry / Lewis' mockorange (*Celtis occidentalis* var. *reticulata* / *Philadelphus lewisii*) community type, page 47

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1. Common snowberry (*Symphoricarpos albus*) >10% cover.....Lewis' mockorange / common snowberry (*Philadelphus lewisii* / *Symphoricarpos albus*) community type, page 44
2. Poison-ivy (*Toxicodendron rydbergii*) >25% cover..... Saskatoon serviceberry / poison-ivy (*Amelanchier alnifolia* / *Toxicodendron rydbergii*) community type, page 48
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- White sagebrush (*Artemisia ludoviciana*) community type, page 46

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- Black greasewood / Saltgrass (*Sarcobatus vermiculatus* / *Distichlis spicata*) association, page 72

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- Northwest Territory sedge (*Carex urticulata*) association, page 53

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- Tufted hairgrass (*Deschampsia cespitosa*) association, page 75

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- Tall mannagrass (*Glyceria elata*) association, page 60

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2. Silverweed cinquefoil (*Argentina anserina*) <1% coverWoolly sedge - common spikerush (*Carex lanuginosa*-*Eleocharis palustris*) association, page 55

1. Introduction

2. Background

3. Methodology

4. Results

5. Discussion

6. Conclusion

7. References

8. Appendix

9. Acknowledgements

10. Contact Information

Nebraska sedge (*Carex nebrascensis*) >25% cover

1. Silverweed cinquefoil (*Argentina anserina*) >1% cover.....Nebraska sedge - silverweed cinquefoil (*Carex nebrascensis* - *Argentina anserina*) community, page 57
2. Silverweed cinquefoil (*Argentina anserina*) <1% cover.....Nebraska sedge (*Carex nebrascensis*) community, page 81

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- Hard-stem bulrush (*Schoenoplectus acutus*), page 52

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- Broadleaf cattail (*Typha latifolia*), page 52

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1. Clustered field sedge (*Carex praegracilis*) more abundant than saltgrass (*Distichlis spicata*) Basin wildrye - clustered field sedge (*Leymus cinereus*-*Carex praegracilis*) community, page 69
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Chairmaker's bulrush (*Schoenoplectus americanus*) >25% cover

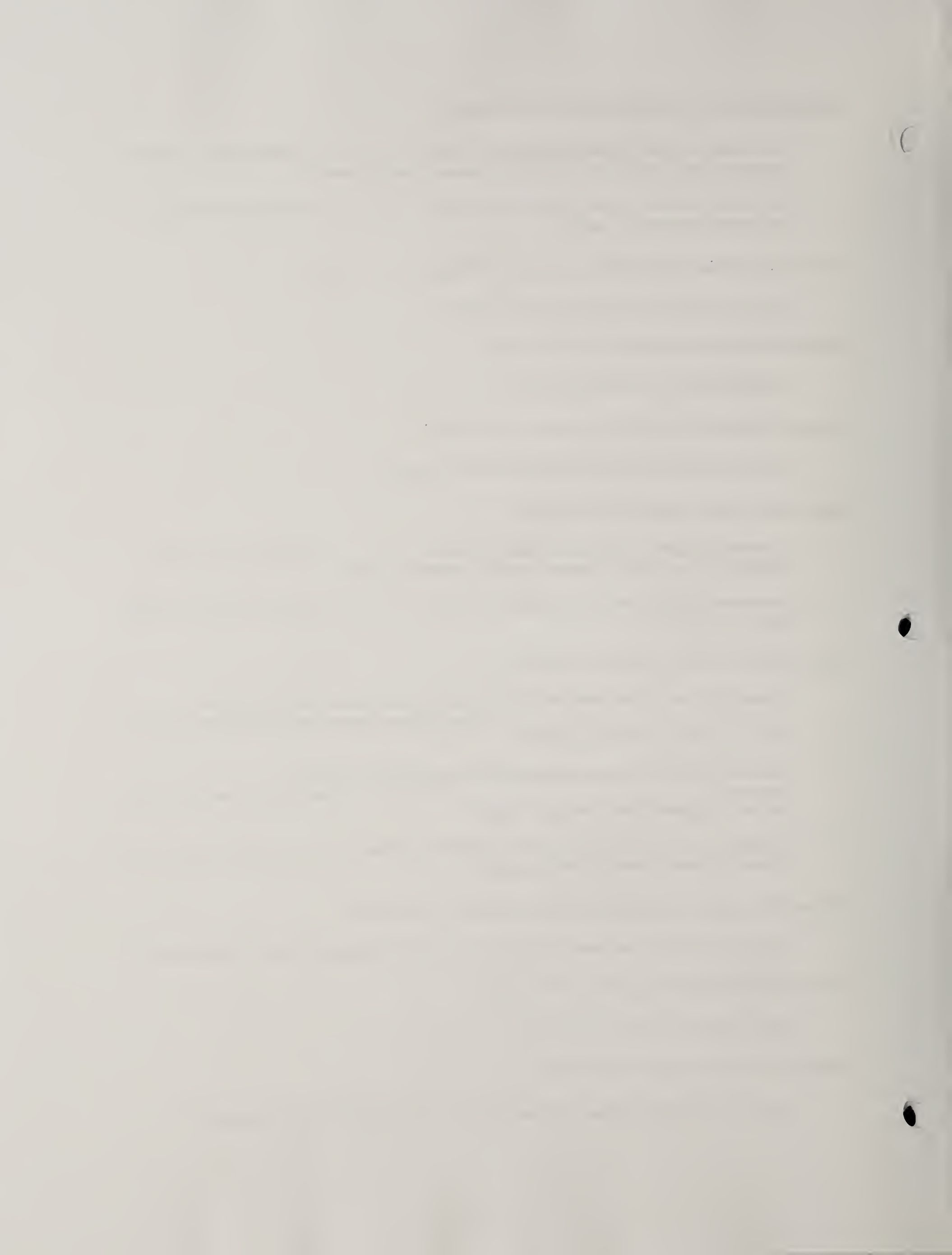
- Saltgrass - Chairmaker's bulrush (*Distichlis spicata* - *Schoenoplectus americanus*) community, page 71

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- Saltgrass - Clustered field sedge (*Distichlis spicata* - *Carex praegracilis*) community, page 66



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- Prairie cordgrass (*Spartina pectinata*) association, page 75

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- Water foxtail (*Alopecurus geniculatus*) community, page 62

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- Watercress (*Rorripa nasturtium-aquaticum*) stand, page 79

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- Broadfruit burreed (*Sparganium eurycarpum*) stand, page 80

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- Common horsetail (*Equisetum arvense*) community type, page 78

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- Reed canarygrass (*Phalaris arundinacea*) association, page 61

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- Bentgrass (*Agrostis stolonifera*) community, page 63

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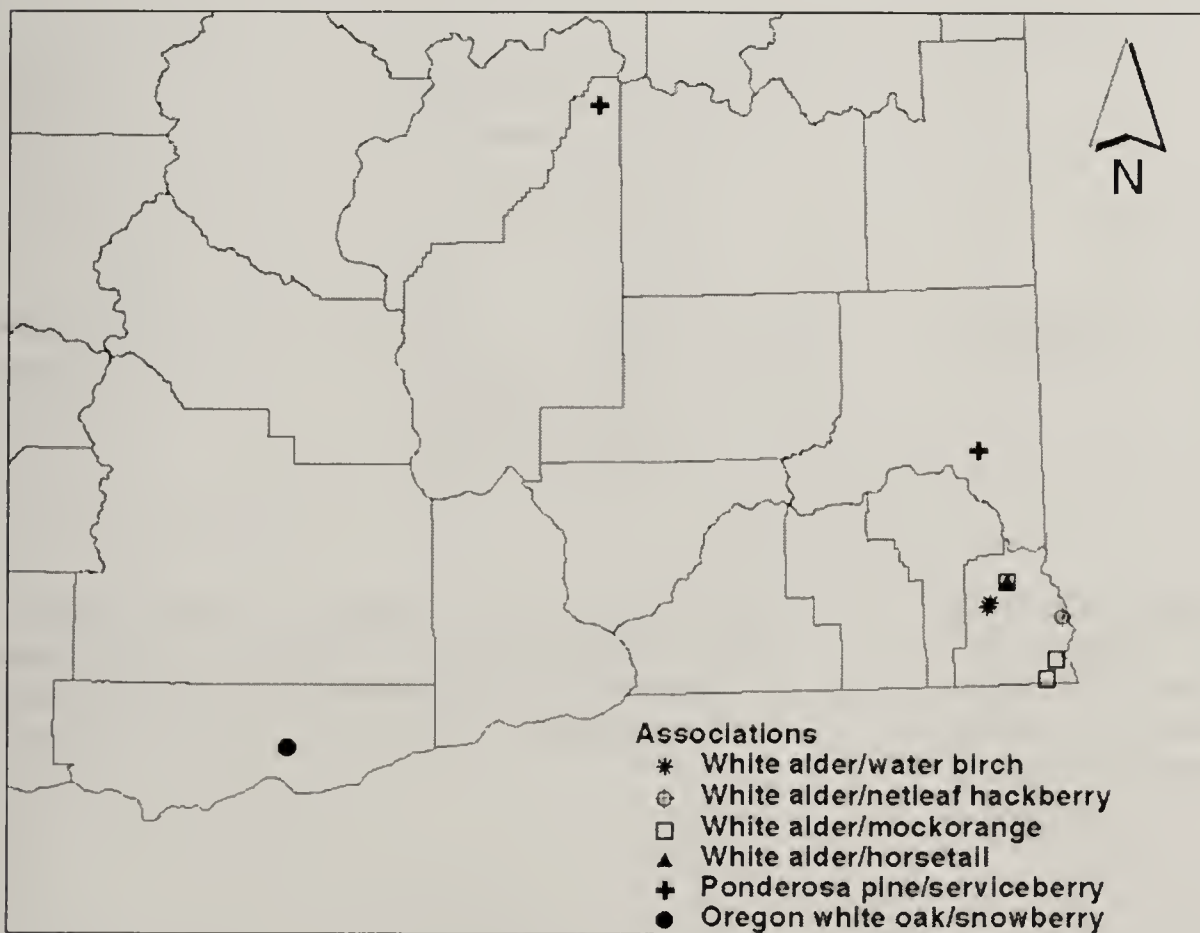
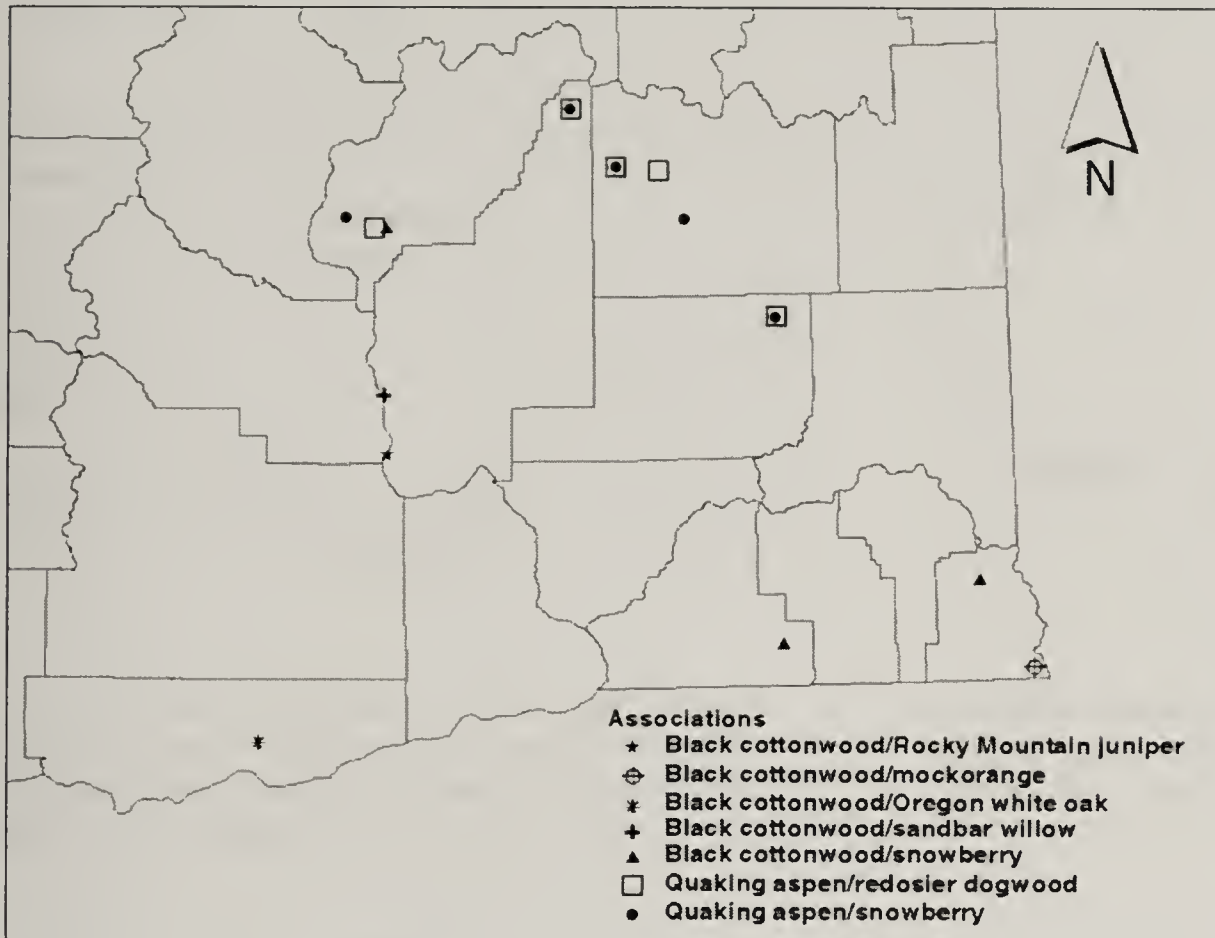
- Quackgrass (*Elytrigia repens* var. *repens*) community, page 64

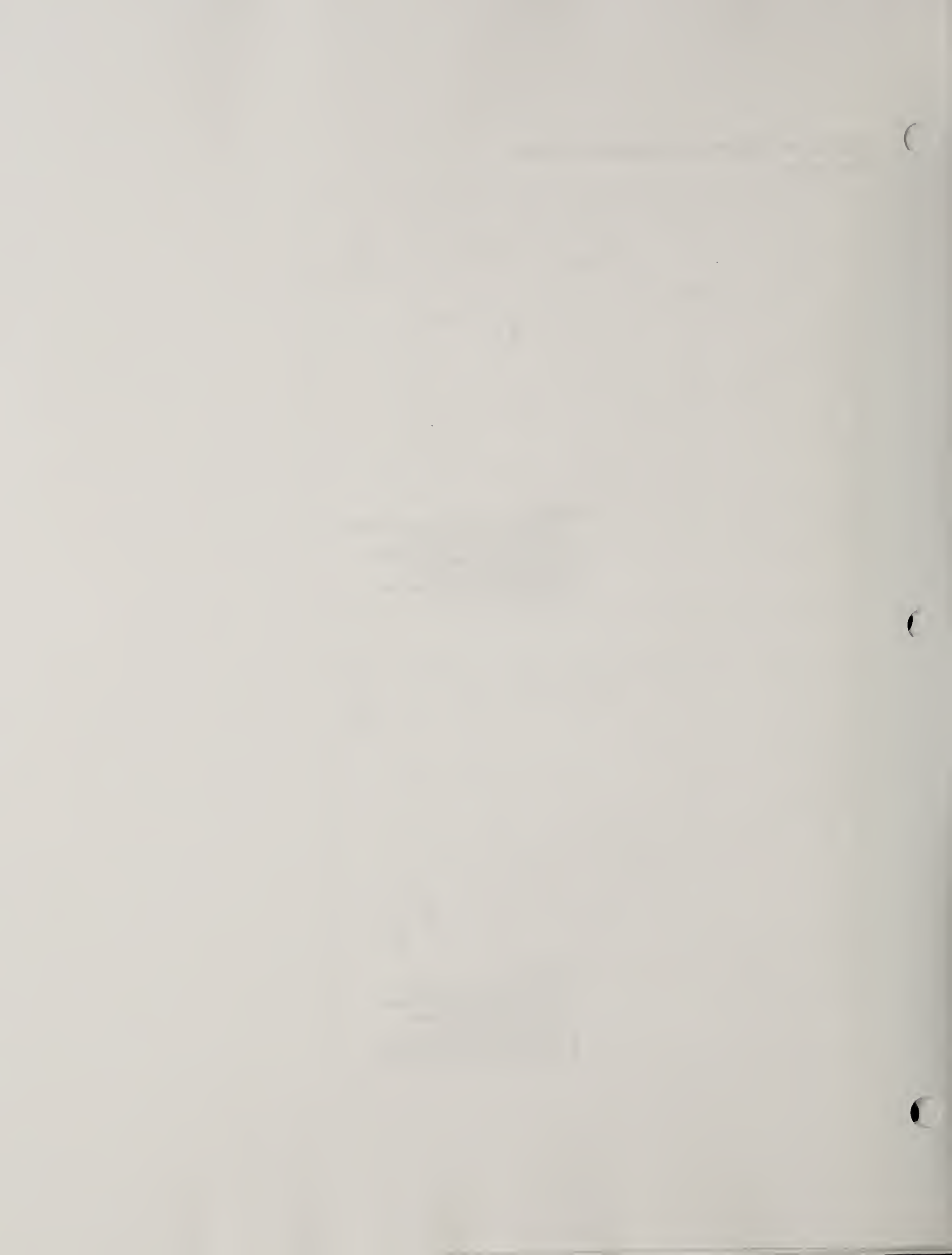
Other herbaceous dominated communities:

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- *Sporobolus cryptandrus* - *Poa secunda*, page 81
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- *Scirpus maritimus* Herbaceous Vegetation, page 81
- Whitewater crowfoot (*Ranunculus aquatilis*) community, page 80
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Tall Tree Riparian Vegetation Types

Plot locations

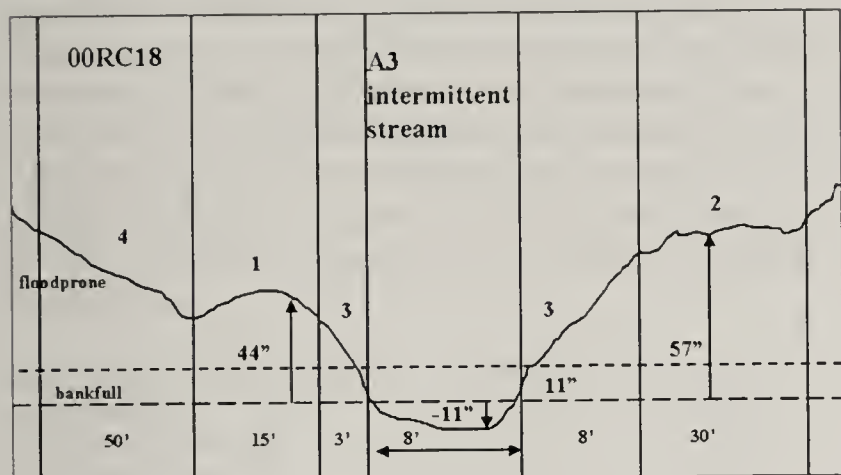




Tall Tree Riparian Vegetation Types

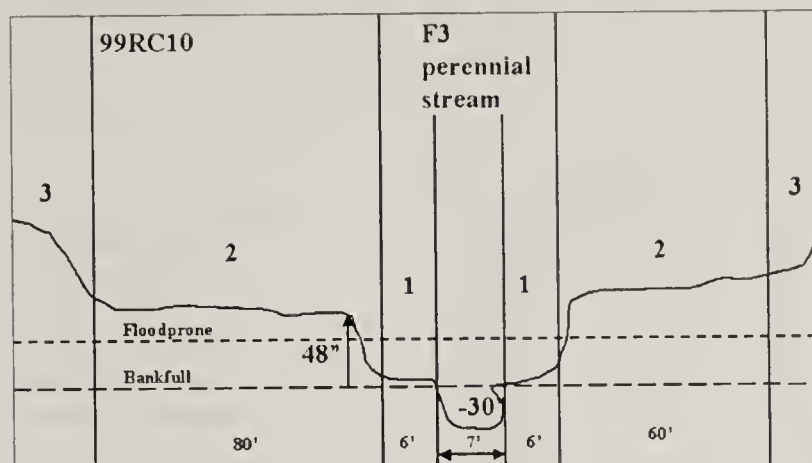
Selected stream profiles

T1



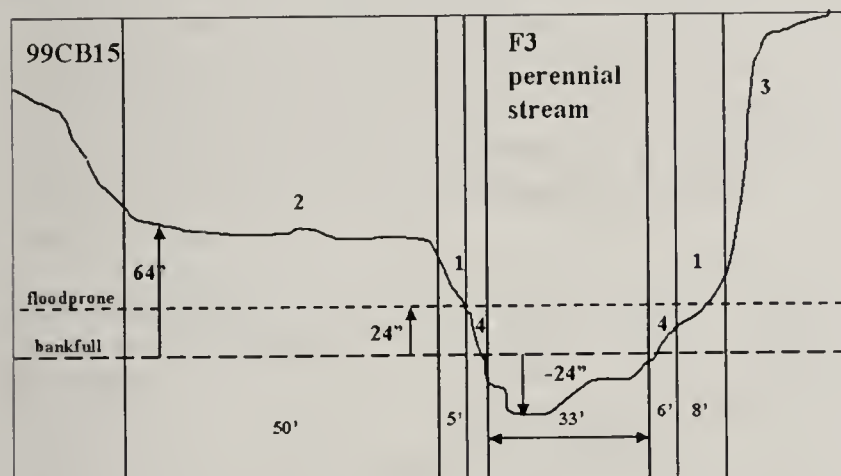
Stream and riparian vegetation profile at Duffy Creek, Douglas County. 1= thinleaf alder / redosier dogwood, 2= quaking aspen / redosier dogwood, 3= streambank, 4= mockorange / common snowberry, and 5= talus.

T2



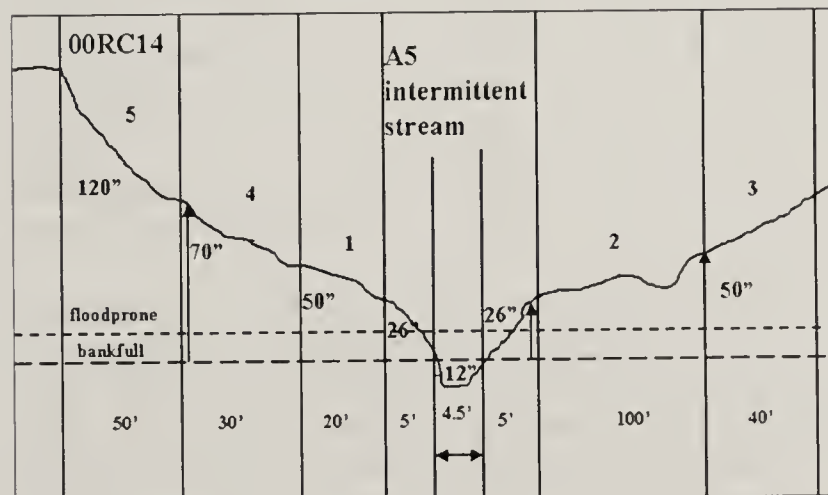
Stream and riparian vegetation profile at Lake Creek, Lincoln County. 1=reed canarygrass, 2=quaking aspen / common snowberry, and 3 = stiff sagebrush upland.

T3



Stream and riparian vegetation profile at Asotin Creek, Asotin County. 1= white alder/ mockorange, 2= black cottonwood / common snowberry, 3= cliff, 4= reed canarygrass, and 5= basin wildrye - cheatgrass.

T4



Stream and riparian vegetation profile Rock Island Creek, Douglas County. 1= Thinleaf alder - yellow willow, 2= yellow willow- redosier dogwood, 3= quaking aspen/common snowberry, 4= black hawthorn/ Wood's rose, and 5= Wyoming big sagebrush/bluebunch wheatgrass.

The first part of the document discusses the importance of maintaining accurate records. It emphasizes that proper record-keeping is essential for ensuring the integrity and reliability of the data collected. This section also outlines the various methods used to collect and analyze the data, highlighting the challenges faced during the process.

The second part of the document provides a detailed description of the experimental setup. It includes information about the equipment used, the procedures followed, and the conditions under which the data was collected. This section is crucial for understanding the context and limitations of the study.

The third part of the document presents the results of the study. It includes a series of tables and graphs that illustrate the findings. The data shows a clear trend, indicating that the variables studied are significantly related. The results are discussed in detail, with an emphasis on the implications of the findings.

The final part of the document concludes the study and provides a summary of the key findings. It also offers some suggestions for future research and discusses the overall significance of the work. The conclusion is based on the evidence presented throughout the document.

Quaking aspen / redosier dogwood association
***Populus tremuloides* / *Cornus sericea* Temporarily**
Flooded Forest
 NVC code: CEGLO00582

Plots 98RC0244, 99RC081, 99RC213, 00RC182, 00RC242

Location. This is a widespread forest community type previously described in Montana, Idaho, Oregon, and Washington. It is found at low to mid elevations in the forested mountains and adjacent lowlands east of the Cascades. In the Columbia Basin, this is a spring, pond edge, and streamside type with samples located in the northern half of Cow, upper Crab, Duffy, and Northrup Creek. It has been observed in most counties of eastern Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	32.4	15	82.5
width of floodplain (ft)	120.8	10	350
entrenchment ratio	2.1	1.06	3.75
stream gradient (%)	4.2	0	15
Rosgen types	A3, C3, E5, F1, Spring		

Fluvial setting. It occurs on alluvial terraces next to streams, rivers or near springs or seeps in broader valleys with very low to low gradients. In the Columbia Basin, this community has been sampled above the floodprone zone along permanent streams and near springs. Sites appear to rarely flood but are saturated early in the growing season and dry by late summer. The upper soil horizons are densely intermingled with roots and are silty loams with few if any coarse fragments. A rocky restrictive layer was encountered at 20 inches on one site. Mottling and/or gleying layers were encountered at 8 inches at one site and not encountered in the top 24 inches at two other sites. See representative stream profile T1 page 22.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	3.1	0.5	7.0
percent slope	7.4	1.0	15.0
Position	2 first terraces, toe slope, lake edge, spring edge		

PERCENT OF GROUND COVER	average	min	max
Litter	88	80	95
Moss	0.2	0	1
Bareground	8.6	0	20
Gravel	0	0	0
Cobble-boulder	3	0	15
Bedrock	0	0	0
Water	0.2	0	1

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=5)	12	0	60
texture	3 silt loam, sandy loam, sapric		

Vegetation. In the Columbia Basin, this is a closed to open canopy forest type with a 25 to 50-foot tall aspen layer over a 3 to 15-foot tall redosier dogwood dominated shrub layer. Golden current and Wood's rose are found in most stands with starry false solomonseal, miner's lettuce, and sticky willy. Common snowberry, a

low shrub, appears in many stands. This community generally occurs between wetter redosier dogwood communities and upland Wyoming big sagebrush or bunchgrass communities.

Management information is summarized in Hansen et al. (1995 page 235).

LAYER HEIGHT (ft)	average	min	max
Trees	31	15	45
Shrubs	12.4	10	15
Herbaceous	1.3	0.5	2

COMMON SPECIES	n=5	cover		
	constancy	average	min	max
Overstory trees	80%	29	13	51
Populus tremuloides	80%	19	13	30
Alnus incana	20%	30	30	30
Prunus virginiana	20%	8	8	8
Understory trees	100%	23	4	43
Populus tremuloides	100%	15	1	40
Prunus virginiana	80%	7	1	13
Alnus incana	20%	8	8	8
Shrubs	100%	97	55	117
Cornus sericea	100%	78	30	98
Rosa woodsii	80%	9	3	13
Ribes aureum	60%	6	1	8
Symphoricarpos albus	60%	3	3	3
Toxicodendron rydbergii	40%	1	1	1
Forbs	100%	27	11	50
Maianthemum stellatum	100%	11	3	20
Urtica dioica	80%	5	1	13
Claytonia perfoliata ssp. perfoliata	40%	12	3	20
Heracleum maximum	20%	1	1	1
Grasses	80%	6	1	15
Phalaris arundinacea	40%	6	3	8
Elymus glaucus	40%	2	1	3
Poa pratensis	20%	3	3	3
Annuals	40%	5	3	6
Galium aparine	40%	3	3	3
Rorippa nasturtium-aquaticum	20%	3	3	3

Classification. This type is similar to a described type along streams in northeastern and southeastern Washington (Crowe and Clausnitzer 1997; Kovalchik 1992; Oregon Natural Heritage Program 1999) but differs by not having conifers, thinleaf alder and other more montane species. These authors considered it a potential vegetation type. More samples of communities below the montane forest zone may justify recognition of a community different from the more montane type.

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Quaking aspen / common snowberry association
Populus tremuloides* / *Symphoricarpos albus
Temporarily Flooded Forest
 NVC code: C EGL000609

Plots 98RC0251, 99RC082, 99RC102, 00RC143, 00RC251

Location. This is a widespread forest community type previously described across western North America. It is found at low to mid elevations in mountains and adjacent lowlands east of the Cascades. In Washington's Columbia Basin, this is a spring and streamside type with samples located in the northern half of Cow Creek, upper Crab, Rock Island, and Northrup Creeks. It has been observed in most counties of eastern Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	35.4	5.3	120
width of floodplain (ft)	26.2	3	75
entrenchment ratio	1.6	1	2.5
stream gradient (%)	5.5	2	15
Rosgen types	F5, F6, F6, G5, Spring		

Fluvial setting. It occurs on alluvial terraces next to streams, rivers or near springs or seeps and usually occurs in broader valleys with low to very low gradients. In the Columbia Basin, this community has been sampled above the floodprone zone. Mottling and/or gleying layers were not encountered in the top 24 inches of soil at two sample sites. See representative stream profiles T2 and T4 page 22.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.3	0	10
percent slope	9.8	1	23
position	first terrace, 2 second terraces, spring edge		

PERCENT OF GROUND COVER	average	min	max
litter	92	80	100
moss	0	0	0
bareground	7	0	20
gravel	0	0	1
cobble-boulder	0	0	0
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=3)	3.3	0	10
texture	3 silt loam		

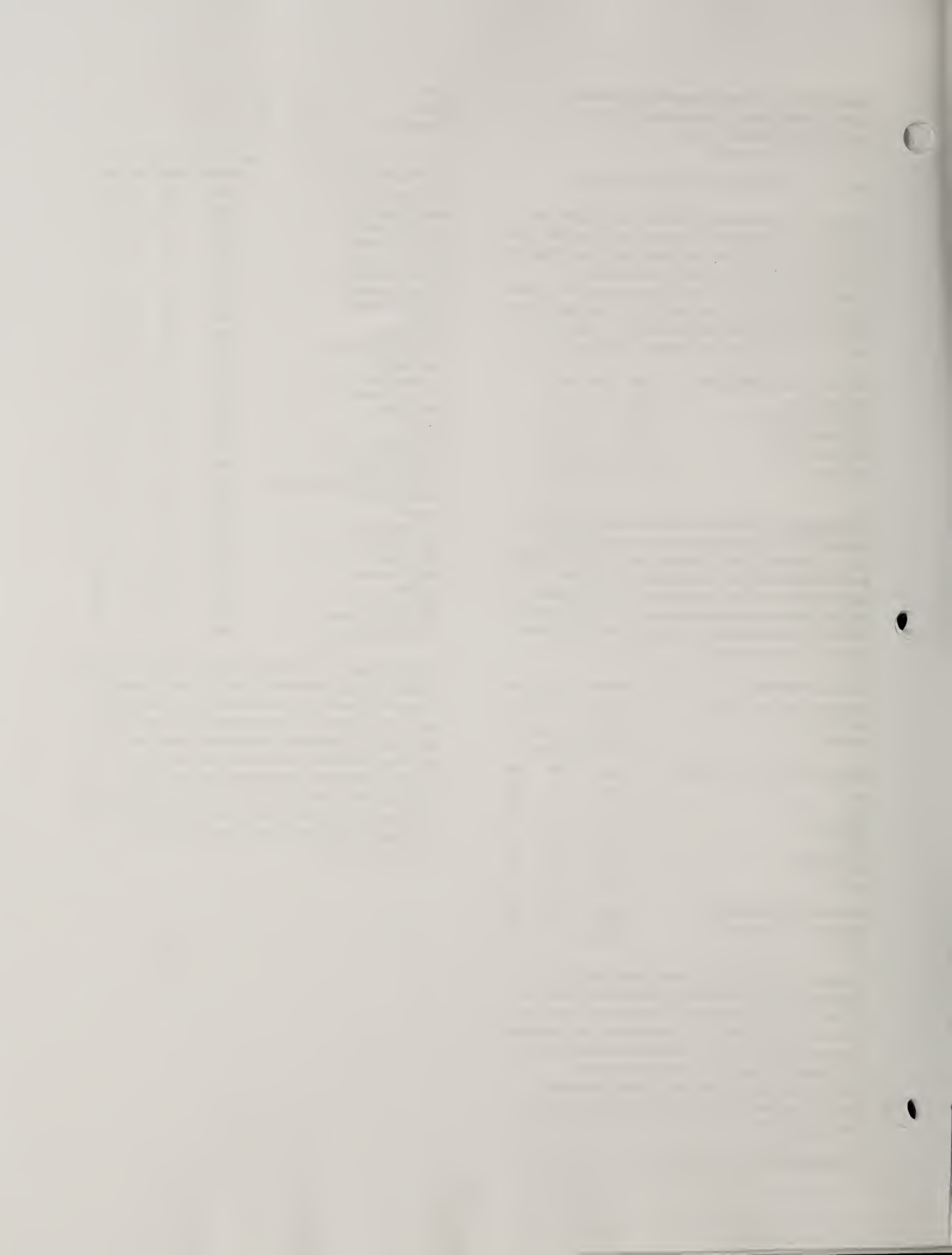
Vegetation. This may be similar floristically to the Quaking aspen / redosier dogwood association but is generally a more open stand of larger trees with a shorter shrub layer dominated by snowberry and only scattered redosier dogwood, if any. In stands more heavily used by livestock, Wood's rose will dominate the undergrowth usually with one or more gooseberry species. Herbaceous species are patchy to scattered in the undergrowth.

LAYER HEIGHT (ft)	average	min	max
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Trees	43	25	60
Shrubs	6	3	15
Herbaceous	2.4	0	4

COMMON SPECIES	n=5 cover			
	constancy	average	min	max
Overstory trees	100%	52	4	80
<i>Populus tremuloides</i>	100%	51	3	80
<i>Prunus virginiana</i>	20%	8	8	8
<i>Betula occidentalis</i>	20%	1	1	1
Understory trees	100%	29	11	58
<i>Populus tremuloides</i>	100%	16	3	30
<i>Prunus virginiana</i>	80%	3	1	8
<i>Crataegus douglasii</i>	40%	26	1	50
Shrubs	100%	84	22	131
<i>Rosa woodsii</i>	100%	25	13	50
<i>Symphoricarpos albus</i>	80%	47	20	98
<i>Ribes aureum</i>	80%	15	1	30
<i>Cornus sericea</i>	60%	6	1	8
<i>Clematis ligusticifolia</i>	40%	1	1	1
<i>Ribes inerme</i>	20%	20	20	20
Forbs	80%	39	16	65
<i>Urtica dioica</i>	60%	11	1	30
<i>Maianthemum stellatum</i>	40%	8	3	13
<i>Solidago canadensis</i>	40%	8	3	13
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	40%	3	3	3
<i>Osmorhiza berteroi</i>	20%	13	13	13
Grasses	80%	26	5	74
<i>Carex lanuginosa</i>	20%	8	8	8
<i>Elytrigia repens</i> var. <i>repens</i>	40%	2	1	3
<i>Poa pratensis</i>	40%	5	1	8
<i>Phalaris arundinacea</i>	20%	60	60	60
Annuals	60%	23	14	31
<i>Galium aparine</i>	60%	11	1	20
<i>Asperugo procumbens</i>	40%	11	8	13
<i>Parietaria pensylvanica</i>	20%	8	8	8

Classification. One sampled stand had large trees and a 15-foot tall black hawthorn shrub layer with scattered redosier dogwood and a conspicuous reed canarygrass layer. Woolly sedge is also present in this stand. This stand may be allied with the **quaking aspen phase of the black hawthorn/ snowberry association** (CEGL001065) described by Daubenmire (1972). As described here community type is a low elevation variant of the **quaking aspen/ common snowberry association** described by Kovalchik (1992) and Crowe and Clausnitzer (1997).



Black cottonwood/snowberry association
Populus balsamifera subspecies *trichocarpa* /
Symphoricarpos albus Temporarily Flooded Forest
 NVC code: CEG000667

Plots 99CB602, 99CB1502, 00RC192

Location. This is a widespread forest community type previously recognized in northern Idaho, Oregon, and Washington. It is found at low to mid elevations in mountains and adjacent lowlands east of the Cascades. In the Columbia Basin, this is a streamside type sampled in Asotin, Douglas, and Walla Walla counties and observed in Yakima, Whitman and Lincoln counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	16.3	10.9	27.1
width of floodplain (ft)	19.2	6	42
entrenchment ratio	1.3	1.1	1.6
stream gradient (%)	3.3	2	5
Rosgen types	A3, F4, G4		

Fluvial setting. This association occurs on alluvial terraces next to streams and rivers across its range. Currently, Columbia Basin samples occur in valleys 30 to 1000 feet wide with 4-5% gradients. The community was sampled well above the floodprone zone along permanent streams 6 and 36 feet wide. Sites rarely if ever flood. The upper soil horizons are densely intermingled with roots and are silty clay loams with few if any coarse fragments. A coarse textured and a cobble layer were encountered at 45 and 12 inches. Mottling and/or gleying layers were not encountered in the top 24 inches of soil at two sites. See representative stream profile T3 page 22.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	6.3	2.7	11.2
percent slope	2	2	2
Position	2 first terraces, second terrace		

PERCENT OF GROUND COVER	average	min	max
Litter	85	70	95
Moss	0	0	0
Bareground	15	5	30
Gravel	0	0	0
cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n= 3)	0	0	0
texture	silty clay loam, sandy clay loam, sandy loam		

Vegetation. In the Columbia Basin, this is a closed canopy forest type with a 60 to 80-foot tall cottonwood layer over a 4-foot tall shrub layer dominated by snowberry with over 50% cover. Short chokecherry trees appeared in both stands. Mockorange and white clematis were recorded in all stands along with stinging nettle. Cottonwood stands initiate on sparsely vegetated

floodbars that capture sediments and build slowly and the channel downcuts or moves laterally away from the surface. So as the stand ages the surface becomes located above the floodprone zone. Cottonwood forests, consequently, are either replaced through succession to species that can grow in a closed canopy community or the surface is eroded away. In the Columbia Basin, water birch, thinleaf alder, chokecherry or black hawthorn are likely late seral communities although ponderosa pine or Douglas-fir may be late seral species if a seed source is available.

Management information is summarized in Hansen et al. (1995 page 250).

LAYER HEIGHT (ft)	average	min	max
Trees	66	60	80
Shrubs	6	3	10
Herbaceous	1.4	1	2

COMMON SPECIES	n=3 cover			
	constancy	average	min	max
Overstory trees	100%	88	53	110
Populus balsamifera ssp. trichocarpa	100%	80	50	100
Prunus virginiana	67%	7	3	10
Understory trees	100%	54	16	120
Prunus virginiana	100%	36	8	80
Populus balsamifera ssp. trichocarpa	100%	8	5	10
Crataegus douglasii	33%	20	20	20
Shrubs	100%	118	106	139
Symphoricarpos albus	100%	77	50	100
Philadelphus lewisii	100%	9	1	20
Clematis ligusticifolia	100%	3	1	8
Rosa canina	67%	1	1	1
Amelanchier alnifolia	33%	20	20	20
Cornus sericea	33%	13	13	13
Rosa nutkana	33%	13	13	13
Physocarpus malvaceus	33%	10	10	10
Forbs	100%	40	19	75
Urtica dioica	100%	1	1	1
Maianthemum stellatum	67%	7	1	13
Cynoglossum officinale	67%	1	1	1
Heracleum maximum	33%	40	40	40
Maianthemum racemosum	33%	20	20	20
Grasses	100%	20	1	52
Phalaris arundinacea	67%	1	1	1
Poa pratensis	33%	20	20	20
Elymus glaucus	33%	8	8	8
Annuals	67%	4	4	4
Galium aparine	33%	1	1	1

Classification. The type described here is similar to a type described along streams in southeastern and northeastern Washington (Crowe and Clausnitzer 1997; Kovalchik 1992) but differs in an absence of conifers, thinleaf alder and other more montane species. More samples of communities below montane forests may justify recognition of a different community from the previously described type.

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Oregon white oak / common snowberry
Quercus garryana* / *Symphoricarpos albus
Temporarily Flooded Forest
 NVC code: C EGL000553

Plot 00RC153, 00RC161, 00RC162

Location. In the East Cascades foothills, Oregon white oak is located along streams in western Klickitat, Yakima, and rarely Kittitas counties, as well as, in adjacent Oregon.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	12.7	12	14
width of floodplain (ft)	17.7	17	18
entrenchment ratio	1.4	1.2	1.5
stream gradient (%)	3	3	3
Rosgen types	2 B2		

Fluvial setting. This type occurs in moderate to narrow valleys with very low to moderate gradients. The community was sampled well above the floodprone zone along a permanent and an unregulated intermittent stream. Soils are wet near the surface for only a short period early in the growing season. There was no reoxidation layer in the top 12 inches of soil at a sample site.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	3.0	2.4	3.5
percent slope	5.0	5.0	5.0
position	first and second terraces		

PERCENT OF GROUND COVER

	average	min	max
litter	75	65	90
moss	7	0	20
bareground	2	0	5
gravel	8	0	25
cobble-boulder	8	5	10
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON

percent of coarse fragments (n=1)	40
texture	sandy clay loam

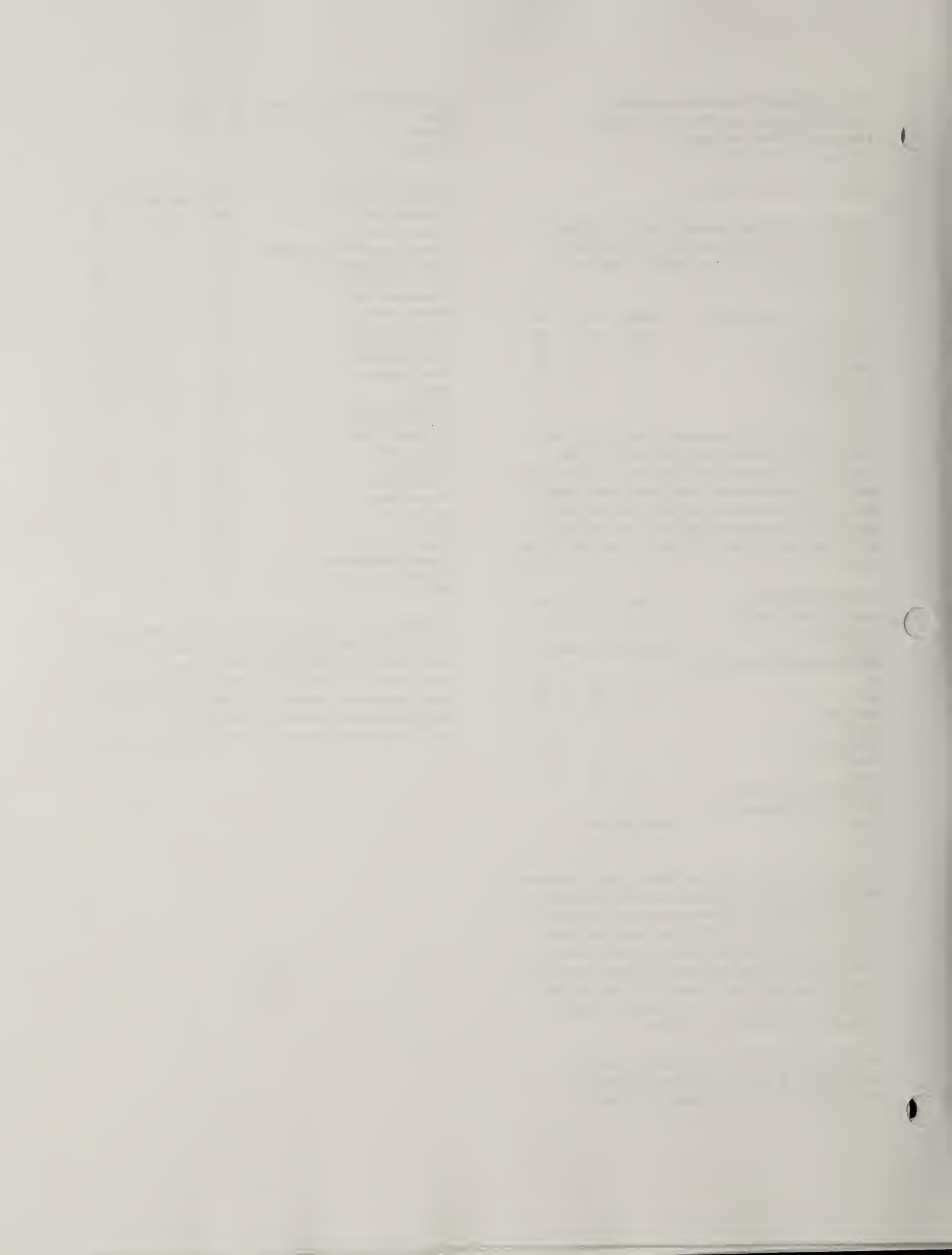
Vegetation. This is a short woodland or forest dominated by Oregon white oak often dominant or co-dominant with ponderosa pine or black cottonwood. Snowberry is always present with over 20% cover along with other shrub species, such as oceanspray and chokecherry. Mockorange was common in the Klickitat County plots, whereas, California hazel is common in Yakima plots (Lillybridge et al. 1995). Blue wildrye and Kentucky bluegrass are common grass species.

Management information is partially available in Lillybridge et al. (1995). Pertinent management information on key species appears in Table 3.

LAYER HEIGHT (ft)	average	min	max
Trees	58	55	60
Shrubs	9	8	10
Herbaceous	2	1	2

COMMON SPECIES	n=3	Cover		
	constancy	average	min	max
Overstory trees	100%	76	53	90
<i>Quercus garryana</i>	100%	28	13	40
<i>Populus balsamorrhiza</i> ssp. <i>trichocarpa</i>	67%	13	13	13
<i>Acer macrophyllum</i>	33%	60	60	60
<i>Alnus rhombifolia</i>	33%	60	60	60
Understory trees	100%	51	39	64
<i>Quercus garryana</i>	100%	4	1	8
<i>Prunus virginiana</i>	67%	50	40	60
<i>Acer macrophyllum</i>	33%	30	30	30
<i>Alnus rhombifolia</i>	33%	8	8	8
<i>Pinus ponderosa</i>	33%	1	1	1
Shrubs	100%	59	47	74
<i>Symphoricarpos albus</i>	100%	23	20	30
<i>Philadelphus lewisii</i>	100%	23	8	30
<i>Holodiscus discolor</i>	100%	7	1	13
<i>Rosa woodsii</i>	67%	6	3	8
Graminoids	100%	13	2	25
<i>Elymus glaucus</i>	100%	6	1	8
<i>Bromus sterilis</i>	67%	6	3	8
<i>Poa pratensis</i>	67%	5	1	8
Forbs	100%	4	2	7
<i>Lomatium dissectum</i>	67%	1	1	1
<i>Maianthemum stellatum</i>	67%	1	1	1
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	33%	3	3	3
Mosses	0%			

Classification. This type is similar to or the same as the Oregon white oak/California hazel-common snowberry association on the Wenatchee National Forest (Lillybridge et al. 1995). More sampling is needed to better understand relationships of this riparian type to the Oregon white oak/blue wildrye community (CEGL000550) on the Yakama Nation (John et al. 1988).



Miscellaneous Tall Tree types.

Black cottonwood/mockorange
Populus balsamifera ssp. *trichocarpa*/*Philadelphus lewisii* Temporarily Flooded Forest
NVC code: none

Plot 99CB1701

This may be a widespread forest community type, tentatively described from 4 plots in eastern Oregon and Washington. It is found at low elevations in mountains and adjacent lowlands east of the Cascades. In the Columbia Basin, it was sampled in Asotin County and is possible elsewhere in Washington. It occurs on alluvial terraces next to streams and rivers. The community was sampled above the floodprone zone (FPI 2) along a 2-foot wide intermittent spring stream. It was associated with Rosgen stream type A4a. The upper soil horizon was a sandy clay loam with few if any coarse fragments. A clay layer was encountered at 18 inches. This is an open canopy forest type with a 60-foot tall cottonwood layer over a 10-foot tall shrub layer dominated by mockorange and/or water birch. Black hawthorn, Wood's rose, poison ivy, and western white clematis are common woody plants. This type is similar to a described type from streams in eastern Oregon (Oregon Natural Heritage Program 1999, 4 plots). It is very similar to the water birch/Lewis' mockorange community on page XXX. More samples of this community are needed to fully describe its ecological characteristics.

Black cottonwood/sandbar willow association
Populus balsamifera subspecies *trichocarpa* / *Salix exigua* Temporarily Flooded Forest
NVC code: CEG000676

Plot 00RC073

This community is found at low elevations in mountains and adjacent lowlands east of the Cascades in Washington, Oregon, Idaho, and Nevada. In the Columbia Basin, it was sampled in Grant County and is possible elsewhere in Washington. This association occurs on alluvial deposits along rivers and perennial streams in habitats that are seasonally flooded and saturated. It generally occurs in wider river valleys or terraces, with black cottonwood dominating forest or woodland patches with sandbar willow dominating the shrub canopy. The community was sampled above the floodprone zone (FPI 3.3) on the first terrace along an irrigation wasteway stream. It was associated with Rosgen stream type C3. This is an open canopy forest type with a 45-foot tall cottonwood layer over a 10-foot tall shrub layer. This type is similar to a described type from streams in eastern Oregon (Oregon Natural Heritage Program) and Nevada (Manning and Paggett 1996). More samples of this community are needed to

fully describe its ecological characteristics in Washington.

Black cottonwood-Rocky mountain juniper
Populus balsamifera subspecies *trichocarpa* - *Juniperus scopulorum* Temporarily Flooded Forest
NVC code: none

Plots 00RC033 00RC034

This community is found in the lowlands east of the Cascades in Washington. It was sampled in Grant County and is possible elsewhere in Washington along the Columbia River. This association occurred on alluvial deposits periodically saturated by changing levels of reservoirs on the Columbia River. Black cottonwood dominates the forest or woodland patches with Rocky Mountain juniper abundant in the lower canopy. The plot nearer bankfull had thinleaf alder as co-dominant in the lower canopy. The invasive exotic climbing multiflora rose (*Rosa multiflora*) is a common feature of this community. This appears to be a new community type developing under hydrologic regimes associated with damming the Columbia River. More samples of this community are needed to verify its classification and to fully describe its ecological characteristics.

Ponderosa pine / Saskatoon serviceberry
Pinus ponderosa / *Amelanchier alnifolia*
Intermittently Flooded woodland
NVC code: none

Plots 99CB1103, 00RC231

This community is found at low elevations in lowlands east of the Cascades in Washington. In the Columbia Basin, it was sampled in Douglas and Whitman counties and is possible elsewhere in Washington. It occurs on alluvial deposits intermittent or perennial streams in habitats that are flooded and saturated. The community was sampled above the floodprone zone (FPI 1.3-2.5) on floodplain and first terrace along stream. It was associated with Rosgen stream type B3. This is an open canopy forest type with a 70-foot tall pine layer over a 8-foot tall shrub layer. It generally occurs in narrow valleys on terraces, with ponderosa pine dominating woodland patches with a mixed shrub canopy. Serviceberry is abundant in both stands with black hawthorn, mockorange, and snowberry common in a stand. One plot (00RC231) is similar to the ponderosa pine/common snowberry floodplain type (CEGL000866) from streams in eastern Oregon (Crowe and Clausnitzer 1997) that lacks serviceberry and mockorange. The other plot (99CB103) similar to the Daubenmire's black hawthorn/cowparsnip (CEGL001081) but with scattered ponderosa pine. More samples are needed to verify this community type.

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White alder/water birch association
Alnus rhombifolia / *Betula occidentalis* Temporarily
Flooded Forest
NVC code: CEGLO00632

Plots 99CB1401, 99CB2501

White alder occurs in tributary valleys of the Snake River in southeastern Washington and adjacent Oregon and Idaho and the in eastern Columbia River Gorge in Washington along streams in Klickitat County and adjacent Yakima County. This community was sampled within the floodprone zone on permanent streams in Asotin County. Stream gradient was 2-3% on Rosgen types C3 and F3. The association occurs on stable and unstable stream channel substrates. This plant association is dominated by broad-leaved, deciduous tree species. White alder is codominant with water birch, both occurring with high cover. Black cottonwood and conifers, such as, Douglas-fir may be associated. A dense, multi-layered, and species-rich deciduous shrub layer characterizes the undergrowth. Species commonly present include Lewis' mockorange, chokecherry, black hawthorn, redosier dogwood, currents, oceanspray and snowberry. Cowparsnip is common and can be abundant. This community is described in Oregon and Idaho (Miller 1976). Similar stands have been observed on Rock Creek in Klickitat County.

White alder/Lewis' mockorange association
Alnus rhombifolia / *Philadelphus lewisii* Temporarily
Flooded Forest
NVC code: CEGLO00634

Plot 99CB101, 99CB1501, 99CB2101

This community was sampled within the floodprone zone on permanent streams in Asotin County. Stream gradient was 3-13% on Rosgen types A3, B3, F4. The association occurs on unstable stream channels within an elevational band of 900-2800 feet, in the deeply incised terrain of the Snake River Canyon. See representative stream profiles T3 page 22 and S8 page 32. Stands of this forest plant association are dominated by broad-leaved, deciduous tree species. White alder is dominant, and occurs with high cover. The understory broad-leaved deciduous shrub layer is dominated by Lewis' mockorange. Other deciduous shrub species commonly present include black hawthorn, gooseberry species, and redosier dogwood. Colonies of the introduced shrub Himalayan blackberry are occasionally present. The herbaceous component of this association is composed of species indicative of disturbance. This community is described in Oregon and Idaho (Miller 1976). This type may be present along Rock Creek in Klickitat County.

White alder/netleaf hackberry association
Alnus rhombifolia / *Celtis occidentalis* var. *reticulata*
Temporarily Flooded Forest
NVC code: CEGLO00633

Plot 99CB2301

This association may be restricted to southeast Washington and adjacent states. The community was sampled well above the floodprone zone on a permanent streams in Asotin county. Stream gradient was 2% on Rosgen stream type F3. These deciduous forest stands are dominated by white alder with netleaf hackberry in the lower canopy. Common chokecherry, black hawthorn, current species, and redosier dogwood are associated shrubs. Cheatgrass is common in most stands. This community is described in Oregon and Idaho (Miller 1976).

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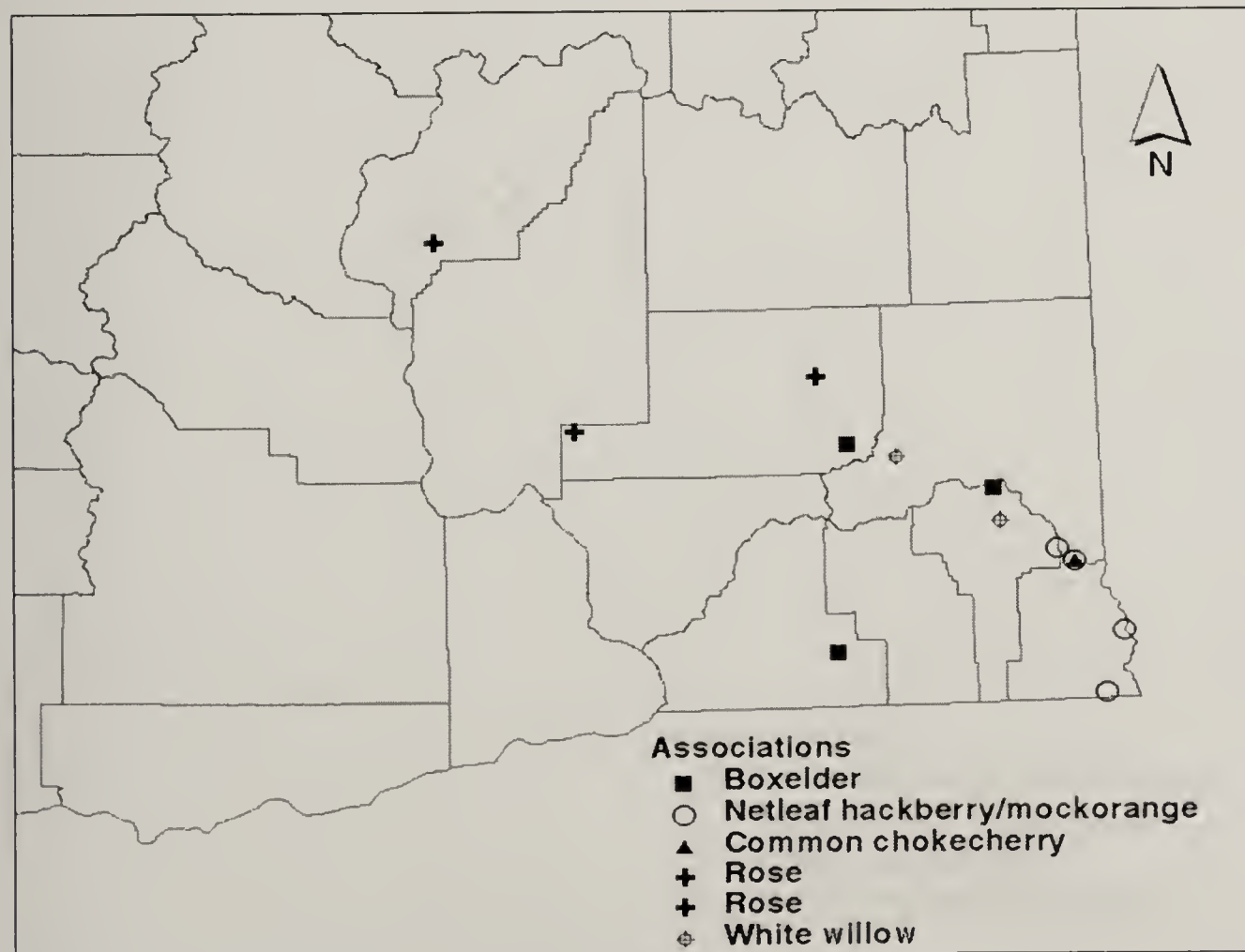
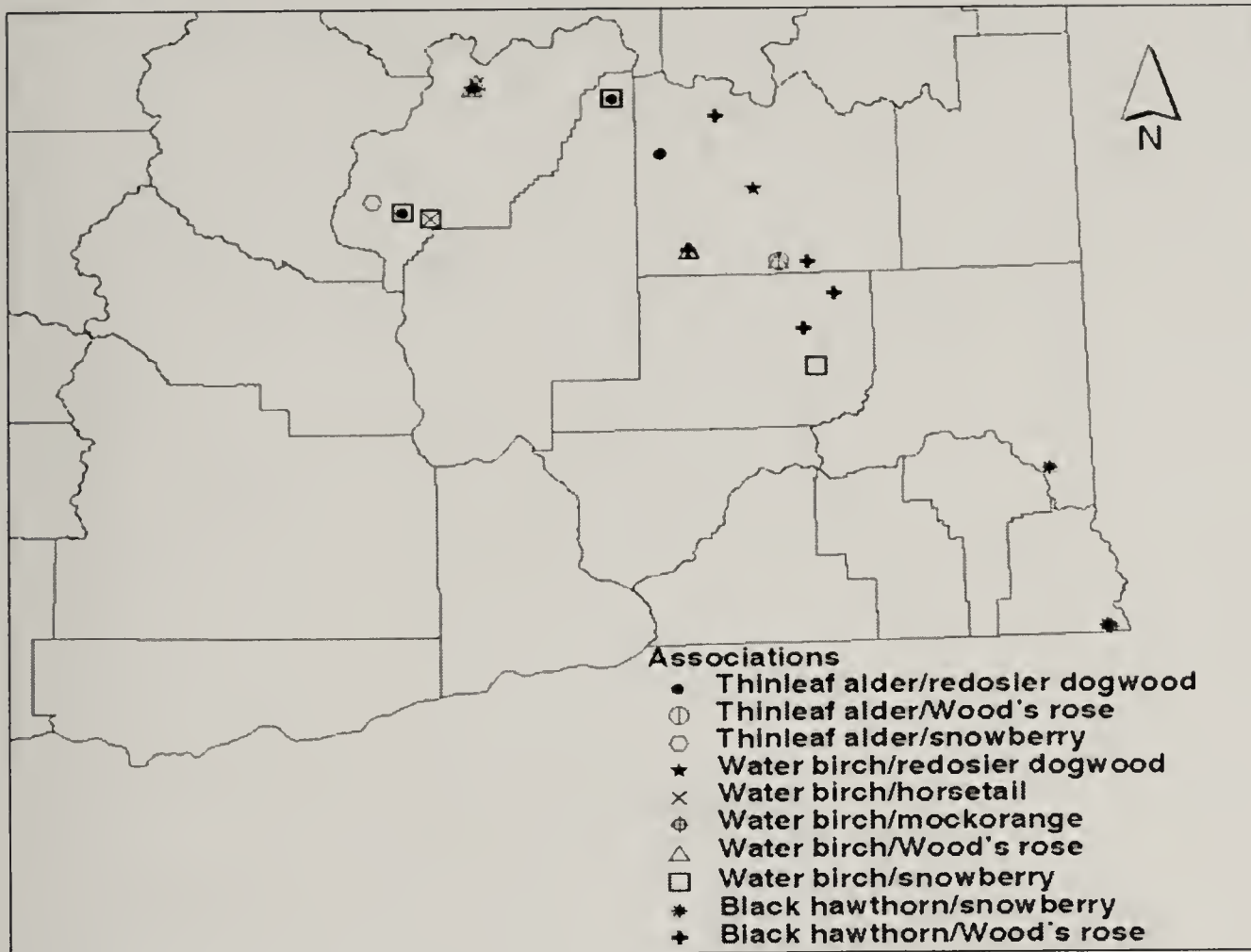
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Short Tree and Shrub Riparian Vegetation Types

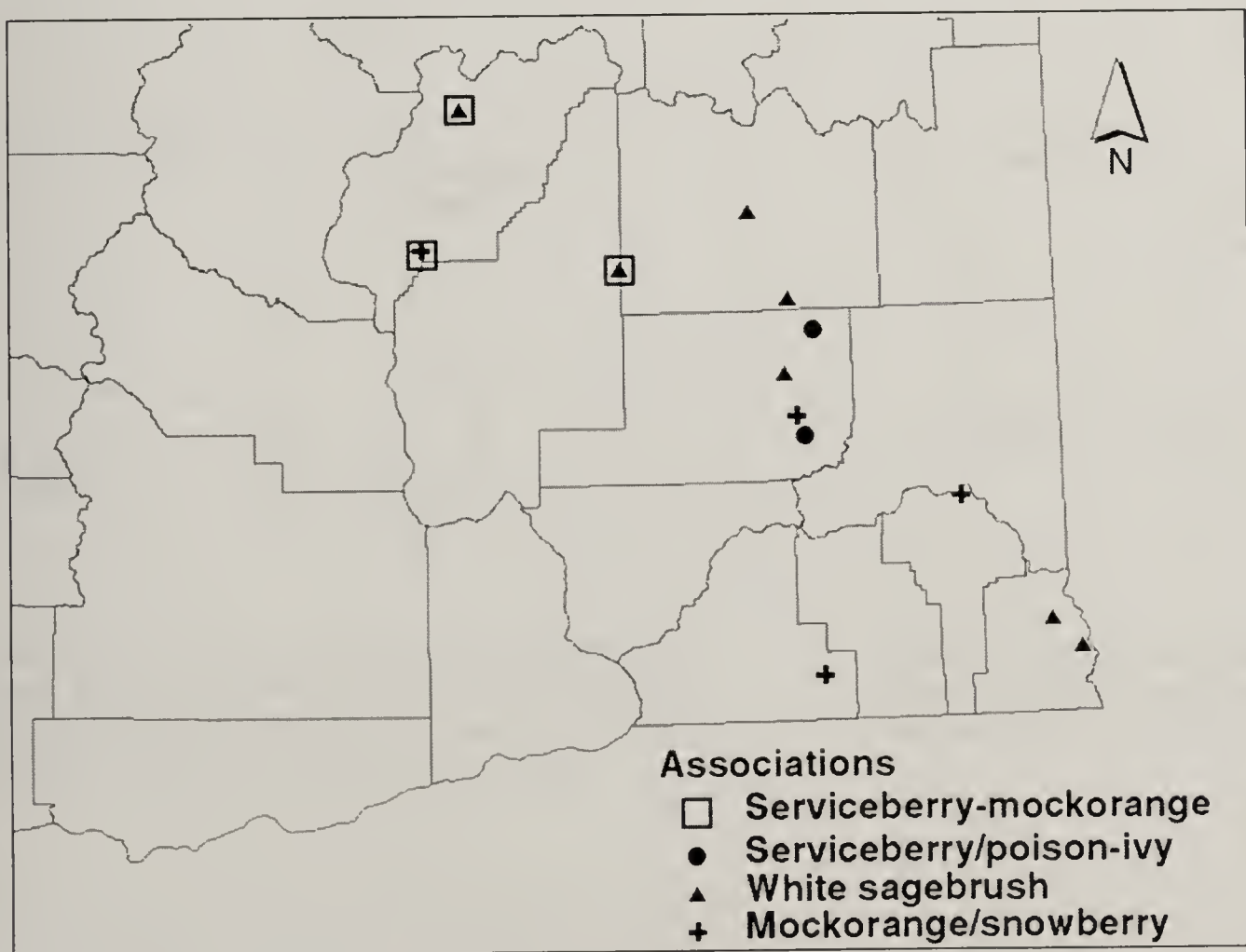
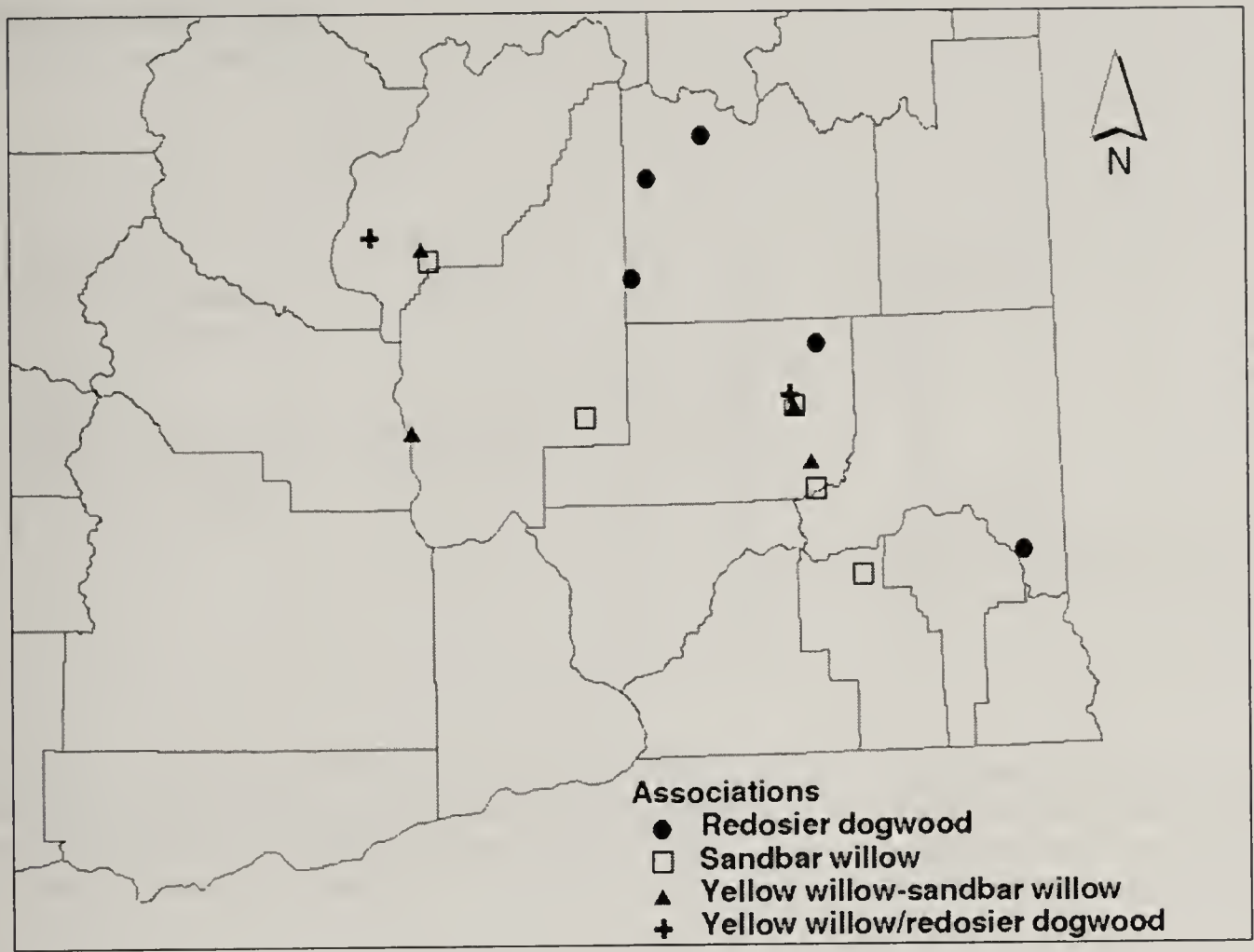
Plot locations

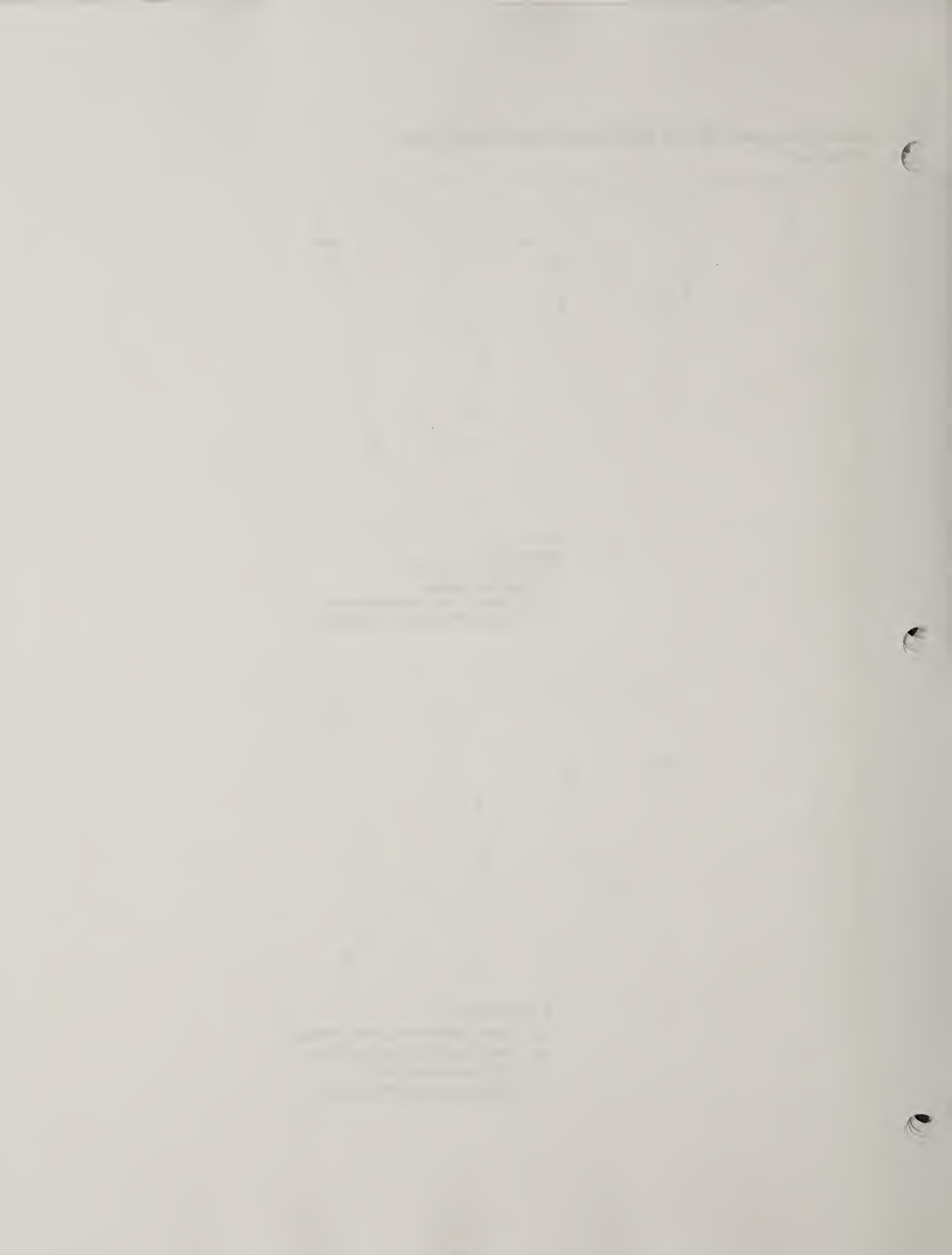




Short Tree and Shrub Riparian Vegetation Types

Plot locations

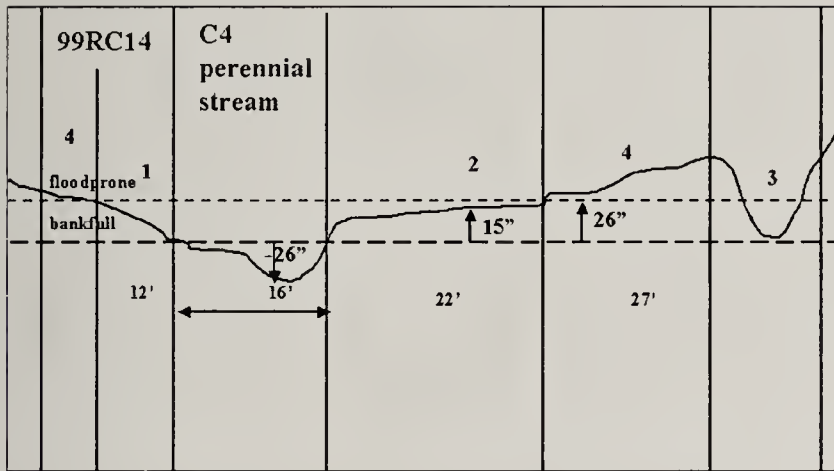




Short Tree and Shrub Riparian Vegetation Types

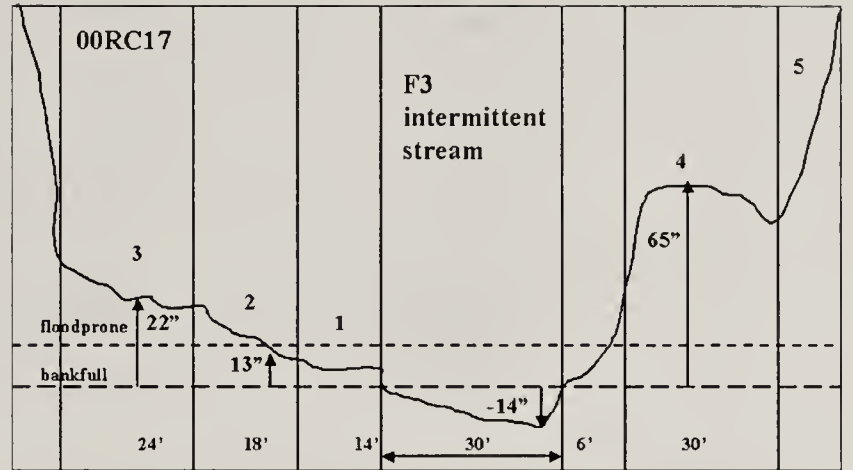
Selected stream profiles

S1



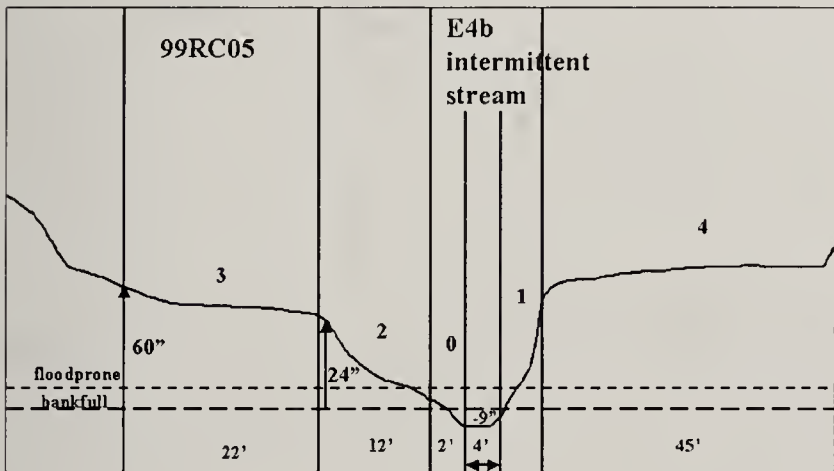
Stream and riparian vegetation profile at Lake Creek, Lincoln County. 1=redosier dogwood, 2= water birch / redosier dogwood, 3 = abandon channel, and 4 = basin wildrye – clustered field sedge.

S2



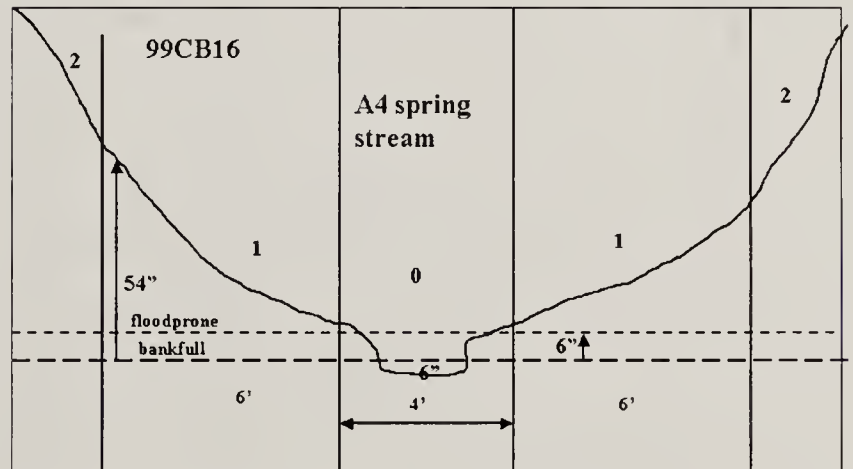
Stream and riparian vegetation profile near Douglas Creek, Douglas County. 1= reed canarygrass, 2= peachleaf willow, 3= water birch / common snowberry, 4=Lewis mockorange/ common snowberry, and 5= railroad fill slope.

S3



Stream and riparian vegetation profile at upper Crab Creek tributary, Lincoln County. 0= water foxtail, 1= white sagebrush, 2=water birch / Wood's rose, 3=black hawthorn / Wood's rose, and 4= Wood's rose.

S4



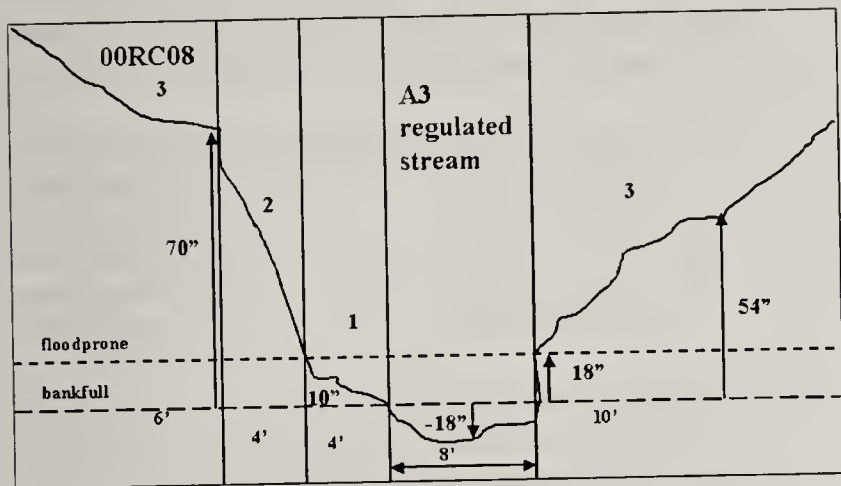
Stream and riparian vegetation profile at Green Creek, Asotin County. 0 =watercress, 1=black hawthorn / common snowberry, and 2 = bunchgrass uplands.



Short Tree and Shrub Riparian Vegetation Types

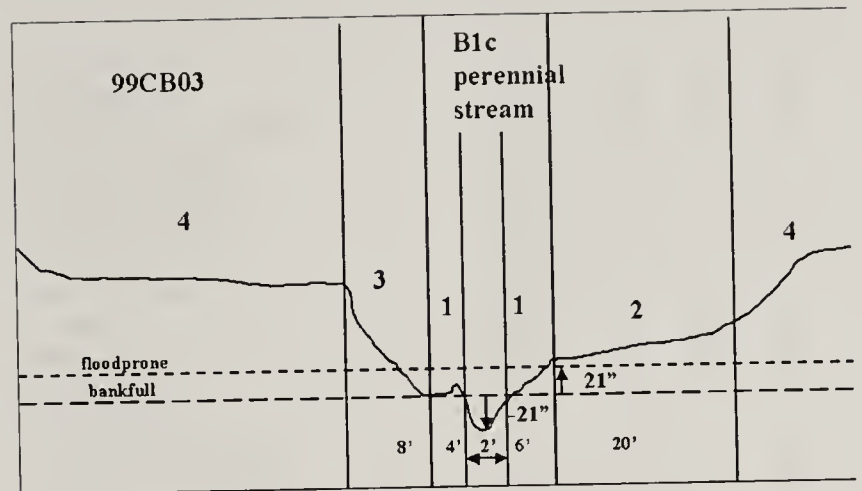
Selected stream profiles

S5



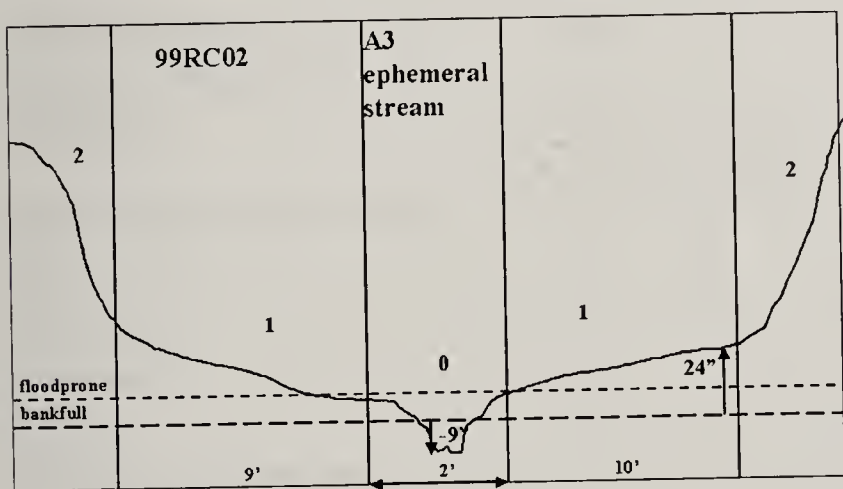
Stream and riparian vegetation profile near George, Grant County. 1= yellow willow – sandbar willow, 2= common horsetail, and 3= Wyoming big sagebrush/bluebunch wheatgrass.

S6



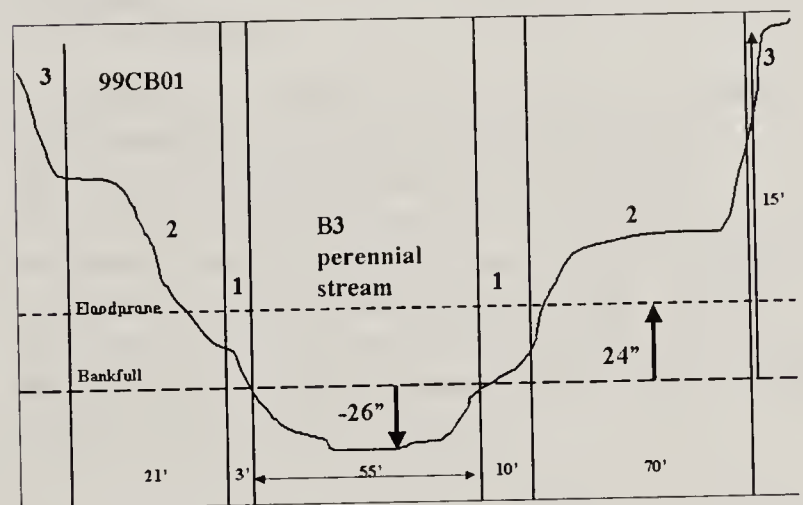
Stream and riparian vegetation profile at Patah Creek, Whitman County. 1=reed canarygrass, 2= sandbar willow, 3 = annual dominated uplands.

S7

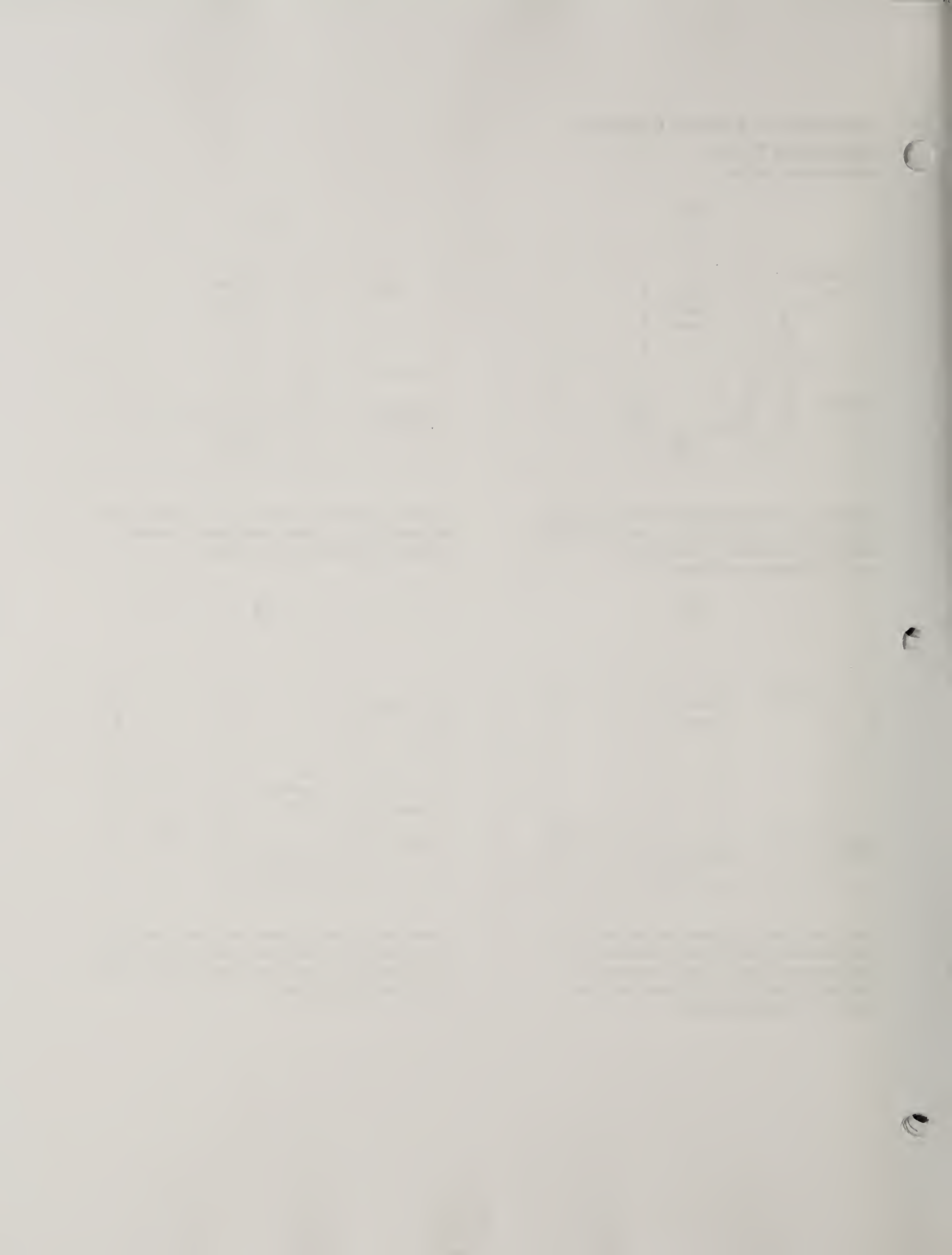


Stream and riparian vegetation profile near Marlin, Lincoln County. 0= bluebunch wheatgrass, 1= Saskatoon serviceberry – Lewis' mockorange / bluebunch wheatgrass, 2 = Wyoming sagebrush / bluebunch wheatgrass uplands.

S8



Stream and riparian vegetation profile at Joseph Creek, Asotin County. 1=White alder /Lewis' mockorange, 2= netleaf hackberry / Lewis' mockorange, and 3 = smooth sumac / bunchgrass uplands.



Thinleaf alder / redosier dogwood association

Alnus incana / *Cornus sericea* association

NVC code: CEG001145

Plots 99RC073, 99RC91, 00RC181, 00RC241

Location. This tall shrubland community is similar to a previously described type found in the mountains of eastern Oregon and Washington. It was sampled in Lincoln and Douglas counties in the Columbia Basin.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	14.1	6.7	18.7
width of floodplain (ft)	44.5	10	75
entrenchment ratio	2.3	1.3	3.0
stream gradient (%)	1.9	1	4
Rosgen types	A3, C4, E4, E5		

Fluvial setting. In the mountains of eastern Washington, it occurs on active fluvial surfaces along Rosgen B streams and within a forest landscape. In the Columbia Basin, it was sampled in 100 to over 300-foot wide valleys with 1-4% gradient. In the Wyoming big sagebrush landscape, this community usually appears along permanent streams near the floodprone zone. Sites appear to flood frequently and the soil surface is wet early in the growing season, drying to the water table by late summer. Mottling and/or gleying layers were encountered at 12 inches at one site and not encountered in the top 24 inches at another site. See representative stream profiles T1 page 22 and G1 page 59.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.2	0	3
percent slope	5.1	0.5	4
Position	floodplain, first & second terraces, abandon channel		

PERCENT OF GROUND COVER	average	min	max
Litter	73	50	4
Moss	0	0	13
Bareground	23	10	0
Gravel	5	0	0
cobble-boulder	0	0	0
Bedrock	0	0	90
Water	0	0	20

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	7	1	13
texture	gravel/cobble, sandy clay loam, silty clay loam		

Vegetation. This community is a closed canopy with a 10 to 20-foot tall shrub thicket of thinleaf alder and redosier dogwood. Either shrub can be dominant but both always contribute significantly to total cover. Thinleaf alder can appear as a tree above the redosier dogwood in some areas. There is usually a shorter, sparse shrub layer of Wood's rose and golden current with white clematis draped among the branches. A patchy herbaceous layer is composed of stinging nettle, sticky willy, thistles, and white-top. Useful management information is in Hansen et al. (1995 page 356).

LAYER HEIGHT (ft)	average	min	max
Trees	24	0	40
Shrubs	9	7	10
Herbaceous	2	0.8	4

COMMON SPECIES	n=4	Cover		
	constancy	average	min	max
Overstory trees	100%	39	8	78
<i>Alnus incana</i>	75%	73	50	90
<i>Salix lucida</i> ssp. <i>caudata</i>	25%	13	13	13
<i>Betula occidentalis</i>	25%	5	5	5
Understory trees	100%	9	1	20
<i>Betula occidentalis</i>	50%	12	3	20
<i>Alnus incana</i>	50%	5	1	8
<i>Prunus virginiana</i>	25%	3	3	3
Shrubs	100%	69	45	98
<i>Cornus sericea</i>	100%	43	30	60
<i>Ribes aureum</i>	75%	9	3	20
<i>Rosa woodsii</i>	75%	6	1	8
<i>Clematis ligusticifolia</i>	75%	3	3	3
<i>Symphoricarpos albus</i>	25%	20	20	20
Forbs	100%	50	12	85
<i>Urtica dioica</i>	100%	6	1	13
<i>Arctium minus</i>	75%	2	1	3
<i>Cardaria draba</i>	50%	32	3	60
<i>Veronica anagallis-aquatica</i>	25%	8	8	8
<i>Maianthemum stellatum</i>	25%	3	3	3
<i>Cicuta douglasii</i>	25%	3	3	3
<i>Geum macrophyllum</i>	25%	1	1	1
<i>Cirsium arvense</i>	25%	1	1	1
<i>Mimulus guttatus</i>	25%	1	1	1
<i>Rumex salicifolius</i>	0%			
<i>Epilobium ciliatum</i> ssp. <i>glandulosum</i>	0%			
Annuals	75%	27	1	67
<i>Galium aparine</i>	50%	7	1	13
<i>Parietaria pensylvanica</i>	0%			

Classification. Overall this type is similar to the thinleaf alder - redosier dogwood/ mesic forb association described by Crowe and Clausnitzer (1997) and Kovalchik (1992) but without montane floristic elements and with Columbia Plateau species. It appears distinct from the thinleaf alder -creek dogwood/blue wildrye association in eastern Oregon (Oregon Natural Heritage Program 1999). Further inventory will likely distinguish this as a distinct community type.

1. Introduction

The first part of the document discusses the importance of maintaining accurate records and the role of the auditor in ensuring the integrity of the financial statements.

2. Scope of the Audit

The scope of the audit is defined by the terms of the engagement letter, which specifies the areas to be examined and the objectives of the audit.

3. Audit Procedures

The audit procedures are designed to provide reasonable assurance that the financial statements are free from material misstatement, whether caused by error or fraud.

4. Findings and Conclusions

The findings of the audit are presented in this section, along with the auditor's conclusions regarding the financial statements and the internal control system.

5. Recommendations

Based on the findings, the auditor provides recommendations to the management to improve the internal control system and address any weaknesses identified.

6. Signatures

This section contains the signatures of the auditor and the management, along with the date of the audit report.

7. Appendix

The appendix contains additional information related to the audit, such as the audit program and the list of documents reviewed.

8. References

The references list the standards and regulations that have been applied in the audit, including the International Standards on Auditing (ISA).

9. Glossary

The glossary defines the key terms used throughout the audit report to ensure clarity and consistency in the communication.

10. Conclusion

The audit has been completed in accordance with the terms of the engagement letter, and the auditor has issued this report to the management.

11. Acknowledgments

The auditor wishes to acknowledge the cooperation and assistance provided by the management and staff throughout the audit process.

12. Contact Information

Contact information for the auditor and the firm is provided at the end of the report for any further inquiries or correspondence.

Water birch / redosier dogwood association
***Betula occidentalis* / *Cornus sericea* association**
 NVC code: CEG001161

Plots 99RC141, 99RC142, 00RC111

Location. This tall shrubland community is similar to a previously recognized type found across the inland Pacific Northwest. It was sampled on Crab and Foster creeks in the Columbia Basin of Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	12.3	9.4	18.2
width of floodplain (ft)	40.8	6.5	58.0
entrenchment ratio	2.8	1.1	3.6
stream gradient (%)	11.7	1.5	32.0
Rosgen types	C4, spring		

Fluvial setting. This community was sampled in 100 to 300-foot wide valleys with 1-3% gradient. These samples appeared within the floodprone zone, along a spring feed reach of an intermittent stream and well above the floodprone zone at a spring. These sites appear to flood annually. Surface soil layers were a silt loams. At one site, 24 inches of mineral soil appears above a buried, saturated organic layer. See representative stream profiles S1 page 31.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	3.2	0.0	9.1
percent slope	11	3	20
position	spring edge, floodplain, first terrace		

PERCENT OF GROUND COVER	average	min	max
litter	65	50	85
moss	3	0	10
bareground	30	10	40
gravel	0	0	0
cobble-boulder	2	0	5
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0	0	0
texture	sand, silt loam		

Vegetation. This community was an open short tree layer of water birch over a shrub thicket dominated by a 20-foot tall redosier dogwood layer. Snowberry was the most abundant associated shrub although both Wood's rose and golden current were present. Starry false solomonseal is always present usually associated with a patchy herbaceous layer with reed canarygrass, Kentucky bluegrass, stinging nettle, sticky willy and pellitory. This type appeared between a redosier dogwood and a clustered field sedge community. Management information applicable to this type is summarized in Hansen et al. (1995 page 340).

LAYER HEIGHT (ft)	average	min	max
Trees	47	30	60
Shrubs	19	18	20

Herbaceous

2.5 0.5 5

COMMON SPECIES	n=3	cover		
	constancy	average	min	max
Overstory trees	100%	79	68	90
<i>Betula occidentalis</i>	100%	36	8	70
<i>Acer negundo</i>	33%	8	8	8
Understory trees	33%	20	20	20
<i>Betula occidentalis</i>	33%	20	20	20
Shrubs	100%	71	57	97
<i>Cornus sericea</i>	100%	53	30	90
<i>Rosa woodsii</i>	100%	3	3	3
<i>Symphoricarpos albus</i>	67%	7	1	13
<i>Ribes aureum</i>	67%	3	3	3
<i>Rosa nutkana</i>	33%	8	8	8
<i>Toxicodendron rydbergii</i>	33%	8	8	8
<i>Salix scouleriana</i>	33%	8	8	8
Forbs	100%	40	3	84
<i>Maianthemum stellatum</i>	100%	6	3	13
<i>Urtica dioica</i>	67%	14	8	20
<i>Impatiens capensis</i>	67%	10	8	13
<i>Geum macrophyllum</i>	67%	8	3	13
<i>Veronica anagallis-aquatica</i>	67%	3	3	3
<i>Epilobium ciliatum</i> ssp. <i>glandulosum</i>	67%	5	3	8
Grasses	100%	31	3	75
<i>Phalaris arundinacea</i>	67%	21	3	40
<i>Poa pratensis</i>	67%	10	1	20
<i>Bromus tectorum</i>	67%	2	1	3
Annuals	100%	19	3	42
<i>Parietaria pennsylvanica</i>	67%	13	13	13
<i>Galium aparine</i>	67%	5	3	8

Classification. This type is tentatively described by Evans (1989) and is similar to the water birch /redosier community type in Hansen et al. (1995) in Montana, Padgett et al. 1989 in Utah, and Manning and Padgett 1989.



Water birch / Common snowberry community type
Betula occidentalis / *Symphoricarpos albus*
 community type
 NVC code: none

Plots 98RC075, 00RC173, 00RC183, 00RC243, 00RC252

Location. This plant association is found in the northern Columbia Basin and was sampled along Cow, Duffy, Douglas, and Northrup creeks in Adams, Douglas, Grant, and Lincoln counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	26	10	60
width of floodplain (ft)	34.6	3	63
entrenchment ratio	1.5	1	2.3
stream gradient (%)	1.9	0.5	4
Rosgen types	A3, E5, F3, F3b, F6		

Fluvial setting. It occurs primarily on fluvial surfaces along intermittent and perennial streams. These samples are from 30 to 100-foot wide valleys with 1-4% gradients and 6 to 20 foot wide streams. This association appears above or high in the floodprone zone on stream terraces. See representative stream profiles S2 page 31.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	3.6	0.6	10
percent slope	5.4	2	10
Position	2 first terraces, 3 second terraces		

PERCENT OF GROUND COVER	average	min	max
Litter	75	30	95
Moss	1	0	4
Bareground	21	0	65
Gravel	1	0	1
cobble-boulder	2	0	5
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	7.5	0	20
texture	3 silt loam, sandy loam		

Vegetation. This is a short tree community, 25 feet tall, dominated by water birch, typically with common chokecherry. A nearly complete cover of woody species characterizes stands. Common snowberry forms dense thickets with water birch, chokecherry, Lewis' mockorange, serviceberry, Wood's or Nootka rose in the undergrowth. White clematis is common growing within and on the shrub layer. A patchy herbaceous layer of starry false Solomon's seal, stinging nettle, blue wildrye, and Kentucky bluegrass characterize this community. On similar drier sites or sites more heavily used by livestock, water birch is less common, and grazing increasers such as Kentucky bluegrass and smooth brome are common.

Shrubs	7	4	12
Herbaceous	2	1	4

COMMON SPECIES	n=5	cover		
	constancy	average	min	max
Overstory trees	60%	46	29	70
Betula occidentalis	60%	41	13	70
Prunus virginiana	20%	8	8	8
Understory trees	100%	30	8	53
Prunus virginiana	80%	20	1	50
Betula occidentalis	80%	17	3	30
Populus tremuloides	20%	3	3	3
Shrubs	100%	117	30	287
Symphoricarpos albus	100%	33	1	70
Clematis ligusticifolia	100%	13	8	20
Philadelphus lewisii	80%	19	1	40
Amelanchier alnifolia	60%	18	3	30
Rosa woodsii	60%	5	3	8
Rosa nutkana	40%	20	20	20
Cornus sericea	40%	12	10	13
Toxicodendron rydbergii	40%	11	8	13
Forbs	100%	41	17	64
Maianthemum stellatum	80%	33	13	50
Urtica dioica	60%	6	1	8
Arctium minus	60%	2	1	3
Equisetum laevigatum	40%	7	1	13
Maianthemum racemosum	20%	8	8	8
Grasses	60%	27	3	57
Elymus glaucus	60%	6	1	13
Poa pratensis	40%	11	8	13
Phalaris arundinacea	20%	30	30	30
Annuals	40%	21	11	30
Galium aparine	40%	19	8	30

Classification. This is an undescribed community type although it has affinities with the water birch / mesic forb association (Crowe and Clausnitzer 1997) although it differs in gooseberry species and rose species. It also differs in a greater abundance of chokecherry, mockorange, and starry false Solomon's seal and has less feathery false lily of the valley. Further inventory will be needed to verify this as a distinct community type.

LAYER HEIGHT (ft)	average	min	max
Trees	28	25	30



Water birch / Wood's rose community type
***Betula occidentalis* / *Rosa woodsii* community type**
 NVC code: CEG001162

Plots 99RC42, 99RC052, 99RC174, 00RC112, 00RC132, 99RC173

Location. This short woodland or tall shrubland community type sampled along upper Crab, Cow, and Foster creeks. It has been observed elsewhere in the Columbia Basin.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	23.6	8	26
width of floodplain (ft)	30.2	6.5	45
entrenchment ratio	1.6	1.1	3.3
stream gradient (%)	7.8	1	32
Rosgen types	A3, E4b, F2, F4, G4		

Fluvial setting. In the Columbia Basin, this community occurs in 30 to over 1000-foot wide valleys typically with less than 3% gradient. It usually occurs well above the floodprone zone along permanent and intermittent streams, although it was within the flood plain (FPI 0.5) at one site. Sites rarely flood and are saturated for only a short period early in the growing season and dry to the water table by late summer. The upper soil horizons are shallow silt loam often mixed with colluvial and alluvial gravels and densely intermingled with roots. There was no redoxidation in the top 24 inches or top 73 inches of soil at two sample sites. See representative stream profile S3 page 31.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	4.4	0.5	10
percent slope	6.8	1	20
position	spring transition, floodplain, 2 first terraces, second terrace		

PERCENT OF GROUND COVER			
litter	90	80	95
moss	0	0	0
bareground	8	0	20
gravel	1	0	5
cobble-boulder	1	0	5
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=4)	0	0	0
texture	sandy loam, silty clay loam, silt loam, silty clay loam		

Vegetation. This closed to open canopy short forest type has a 15 to 30-foot tall water birch layer over a 3 to 8-foot tall Wood's rose and golden current open shrub layer. Western white clematis grows over the shrub and short trees in most stands. Thinleaf alder nearly co-dominates one site. There is a dense but patchy herbaceous layer of stinging nettle, Canadian thistle, and white sagebrush. The herbaceous layer in one stand was dominated by starry false Solomon's seal. On similar drier sites or sites more heavily used by livestock, water birch is less common, and grazing increasers such as

Kentucky bluegrass and smooth brome are common. This type appeared between a wetter woolly sedge and upland Idaho fescue - bluebunch wheatgrass. Management information applicable to this type is summarized in Hansen et al. (1995 page 355). Water birch has very high nutritional requirements especially for magnesium and calcium (Fire Effects Information System).

LAYER HEIGHT (ft)	average	min	max
Trees	24.7	15	30
Shrubs	4.8	3	8
Herbaceous	3.4	1.5	6

COMMON SPECIES	n=5	cover		
	constancy	average	min	max
Overstory trees	100%	66	50	100
<i>Betula occidentalis</i>	100%	62	30	100
<i>Alnus incana</i>	20%	20	20	20
Understory trees	60%	21	3	30
<i>Betula occidentalis</i>	60%	20	1	30
<i>Prunus virginiana</i>	20%	1	1	1
Shrubs	100%	27	8	57
<i>Rosa woodsii</i>	100%	18	3	40
<i>Clematis ligusticifolia</i>	80%	7.5	1	13
<i>Artemisia ludoviciana</i>	60%	2.3	1	3
<i>Ribes aureum</i>	40%	3	3	3
<i>Toxicodendron rydbergii</i>	20%	1	1	1
Forbs	100%	65	8	134
<i>Urtica dioica</i>	60%	17	1	50
<i>Cirsium arvense</i>	60%	15	1	40
<i>Maianthemum stellatum</i>	40%	45	30	60
<i>Cardaria draba</i>	20%	60	60	60
<i>Agastache urticifolia</i>	40%	4.5	1	8
<i>Solidago canadensis</i>	40%	2	1	3
Grasses	100%	53	13	129
<i>Poa pratensis</i>	60%	33	20	50
<i>Bromus inermis</i>	60%	31	3	70
<i>Phalaris arundinacea</i>	40%	3	3	3
<i>Juncus balticus</i>	40%	2	1	3
<i>Poa bulbosa</i>	40%	2	1	3
<i>Leymus cinereus</i>	20%	30	30	30
<i>Elymus glaucus</i>	20%	13	13	13
Annual forbs	100%	7.2	1	24
<i>Amsinckia lycopsoides</i>	60%	5.7	1	13
<i>Galium aparine</i>	60%	1.7	1	3

Classification. Crawford (1998) referred to this as the Water birch / starry false Solomon's seal community type (*Betula occidentalis* / *Maianthemum stellatum*) community type. It is similar to the water birch-mockorange/western clematis association described by the Oregon Natural Heritage Program (1999) but without any mockorange. It may be a disclimax of the water birch/common snowberry association. This type is similar to the Water birch / mesic forb association in Oregon (Crowe and Clausnitzer 1997) that has thinleaf alder and snowberry as common features.

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Black hawthorn / common snowberry plant association

***Crataegus douglasii* / *Symphoricarpos albus* plant association**

NVC code: CEGl0001096

Plots 99CB1003, 99CB1603

Location. This plant association is found in the Columbia Basin primarily within the Palouse region of southeastern Washington, northeastern Oregon and adjacent Idaho.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	7.3	6.7	8.0
width of floodplain (ft)	6.1	5.7	6.5
entrenchment ratio	1.5	1.4	1.6
stream gradient (%)	8.5	7	10
Rosgen types	A1, A4		

Fluvial setting. This association occurs on fluvial surfaces along intermittent and perennial streams and near springs. It was originally described from valleys with less than 3% gradients in the Palouse Prairie likely associated with Rosgen stream types C and F. These two samples are from narrow V-shaped valleys with over 8% gradient and with stream gradients over 40%. Samples were well above the floodprone zone along a permanent and intermittent stream. Soils are sandy textured and well drained. See representative stream profile S4 page 31.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	5.9	10.0	5.9
percent slope	52	40	64
position	stream bank, lake edge		
PERCENT OF GROUND COVER	average	min	max
litter	95	90	100
moss	2.5	0	5
bareground	0	0	0
gravel	0	0	0
cobble-boulder	2.5	0	5
bedrock	0	0	0
water	0	0	0
SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	20	0	40
texture	silty clay loam, sandy clay loam		

Vegetation. This is a closed canopy short tree or shrub thicket, 6 to 10 feet tall. Black hawthorn forms dense thickets over a shrub understory with over 20% cover of snowberry with spiraea, serviceberry, Wood's or Nootka rose or mockorange. Stands have few sedges or rushes and low cover of grasses, most commonly, cheatgrass and Kentucky bluegrass. Forbs average 25% cover and include a variety of species. Sweet cicely, sticky willy, dandelion and gypsyflower were present in both stands. This type appears between the channel or a mockorange / white sagebrush community and bunchgrass steppe on the adjacent upland.

Management information is summarized in (Crowe and Clausnitzer 1997 page 154).

COMMON SPECIES	n=2	cover		
	constancy	average	min	max
Overstory trees	50%	10	10	10
Populus balsamorhiza ssp. trichocarpa	50%	10	10	10
Understory trees	100%	105	100	111
Crataegus douglasii	100%	100	100	100
Populus balsamorhiza ssp. trichocarpa	50%	1	1	1
Shrubs	100%	166	121	211
Symphoricarpos albus	100%	55	20	90
Philadelphus lewisii	100%	51	1	100
Spiraea betulifolia	100%	15	10	20
Amelanchier alnifolia	100%	10	10	10
Holodiscus discolor	50%	20	20	20
Physocarpus malvaceus	50%	20	20	20
Forbs	100%	33	11	55
Cynoglossum officinale	100%	5	1	10
Osmorhiza pupurea	100%	1	1	1
Arnica cordifolia	50%	30	30	30
Grasses	100%	26	7	50
Bromus tectorum	100%	6	3	10
Poa pratensis	50%	20	20	20
Annuals	100%	3	1	5
Galium aparine	100%	2	1	3
Mosses	50%	10	10	10

Classification. This is the typical phase of the black hawthorn / snowberry type described by Daubenmire (1970); see that reference for more detailed descriptions. An abundance of snowberry, presence of blue wildrye and little or no Wood's rose distinguish this association from the black hawthorn/ Wood's rose association.



Black hawthorn / Woods' rose community type
***Crataegus douglasii* / *Rosa woodsii* community type**
 NVC code: CEG0001095

Plots 98RC114, 98RC243, 99RC053, 99RC152, 99RC193

Location. This deciduous shrubland or short tree community is a poorly described type in eastern Washington and Oregon. It has been observed in Lincoln, Douglas, Grant, Adams, and Benton counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	20.9	7.7	60
width of floodplain (ft)	68.8	13	108
entrenchment ratio	2.8	1.7	3.7
stream gradient (%)	1.63	0.5	3
Rosgen types	2 C3, D3, E4b, E5		

Fluvial setting. This association occurs along low elevation, low gradient streams with broad floodplains that flood seasonally. Due to the low gradients, the floodplains are rarely scoured surfaces. It occurs primarily on fluvial surfaces along intermittent streams but also occurs with perennial streams and springs. It was sampled in 100 to 1000 feet wide valleys with less than 3% gradients. This community lines creeks in the upper floodprone zone. It is well above the floodprone zone along permanent streams and on a spring creek. Sites currently appear to rarely flood and associated with entrenched streams, average entrenchment ratio of 2.8. Soils are coarse-textured and well drained. There was not Mottling and/or gleying layers in the top 24 inches of soil at the three sites sampled. See representative stream profiles T4 page 22, S3 page 31, and G2 page 59.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.3	0.57	6.6
percent slope	5	1	10
position	floodplain, 3 first terraces, second terrace		

PERCENT OF GROUND COVER	average	min	max
litter	58	30	90
moss	0	0	0
bareground	34	10	70
gravel	0	0	0
cobble-boulder	2.2	0	10
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	0.75	0	3
texture	3 silt loam, sandy loam		

Vegetation. This is a closed canopy, 10 to 20-foot tall shrub thicket dominated by black hawthorn. Woods' rose is common and maybe abundant in the black hawthorn layer. Golden current and common snowberry are frequent, low cover associates in a shorter shrub layer. Stands have few sedges or rushes and have a low cover of grasses, even though blue wildrye and cheatgrass were in 60% of the samples. Forbs averaged 23% cover and are composed of a variety of species.

Starry false Solomon seal, Canadian thistle, stinging nettle, and sticky willy are common in all stands. This type appears between a wetter reed canarygrass or redosier dogwood and saltgrass - clustered field sedge, Quaking aspen or basin wildrye communities on drier fluvial surfaces. Management information is summarized in Hansen et al. (1995 page 359).

LAYER HEIGHT (ft)	average	min	max
Trees	13	0	25
Shrubs	6.2	0	15
Herbaceous	2.8	1	7

COMMON SPECIES	n=5	cover		
	constancy	average	min	max
Overstory trees	40%	60	40	80
<i>Crataegus douglasii</i>	40%	60	40	80
Understory trees	100%	41	1	90
<i>Crataegus douglasii</i>	100%	40	1	90
<i>Prunus virginiana</i>	20%	1	1	1
Shrubs	100%	43	25	89
<i>Rosa woodsii</i>	100%	27	13	60
<i>Ribes aureum</i>	100%	6	3	8
<i>Symphoricarpos albus</i>	80%	6	1	13
<i>Artemisia ludoviciana</i>	60%	2	1	3
<i>Clematis ligusticifolia</i>	20%	20	20	20
<i>Philadelphus lewisii</i>	0%		0	0
Forbs	100%	39	9	75
<i>Urtica dioica</i>	100%	7	1	13
<i>Maianthemum stellatum</i>	80%	11	3	20
<i>Cirsium arvense</i>	80%	7	3	13
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	60%	5	1	13
<i>Heracleum maximum</i>	20%	3	3	3
Grasses	100%	40	11	75
<i>Bromus tectorum</i>	60%	27	8	60
<i>Elymus glaucus</i>	60%	10	8	13
<i>Bromus inermis</i>	60%	7	1	13
<i>Poa pratensis</i>	40%	11	10	13
Annuals	100%	9	1	30
<i>Galium aparine</i>	100%	4	1	13

Classification. This type is the black hawthorn / Woods rose association recognized by the Washington Natural Heritage Program and by Crawford (1998,1999). It may be a grazing disclimax of the black hawthorn / snowberry type described by Daubenmire (1970). The Oregon Natural Heritage Program describes a similar community as the black hawthorn/common snowberry-blue wildrye association.



Woods' or Nootka rose community
***Rosa woodsii* or *R. nutkana* community**
 NVC code: CEG0001126

Plots 98RC143, 00RC063, 00RC202

Location. This deciduous shrubland community is similar to a described type in Montana. It has been observed across Washington's Columbia Basin and sampled in Adams and Douglas counties.

STREAM CHARACTERISTICS	Average	min	max
width:depth ratio	11.2	4.0	15.0
width of floodplain (ft)	190	30	500
entrenchment	11.5	1.5	31.3
stream gradient (%)	1.5	0.5	3.0
Rosgen types	B1, B6, E6		

Fluvial setting. This community was sampled in wide canyons within the floodprone zone and on a toeslope. These sites are flat to slightly convex and appeared to rarely, if ever, flood. Soils are fine textured and moderately well drained. See representative stream profile S3 page 31.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.0	0.4	1.7
percent slope	7.8	0.5	15
position	2 floodplains, toe slope		
PERCENT OF GROUND COVER			
litter	79	60	98
moss	0	0	0
bareground	0	0	0
gravel	0	0	0
cobble-boulder	1	0	2
bedrock	0	0	0
water	20	0	40
SOIL SURFACE CHARACTERISTICS			
percent of coarse fragments (n=2)	0.5	0	1
texture	silt loam		

Vegetation. This is a closed canopy tall shrub thicket dominated by Wood's or Nootka rose. This 6 to 10-foot tall shrub patch contained golden current and sandbar willow. Reed canarygrass and common horsetail are the most frequent herbaceous plants typically accompanied by one of several weedy species. The same fluvial surfaces that are not isolated from early season grazing support an intermediate wheatgrass pasture with clustered field sedge and a narrow reed canarygrass community along the incised channel. Management information applicable to this type is summarized in Hansen et al. (1995 page 369).

Trees	0	0	0
Shrubs	5.5	3	8
Herbaceous	4.5	3	6

COMMON SPECIES	n=3 cover			
	constancy	average	min	max
Shrubs	100%	60	13	92
<i>Rosa woodsii</i>	67%	50	30	70
<i>Rosa nutkana</i>	33%	13	13	13
<i>Artemisia ludoviciana</i>	67%	1	1	1
<i>Toxicodendron rydbergii</i>	33%	40	40	40
<i>Ribes aureum</i>	33%	13	13	13
Grasses	100%	43	1	109
<i>Phalaris arundinacea</i>	67%	36	1	70
<i>Juncus balticus</i>	33%	30	30	30
<i>Bromus inermis</i>	33%	8	8	8
<i>Poa pratensis</i>	33%	8	8	8
<i>Agrostis stolonifera</i>	33%	3	3	3
Forbs	100%	55	42	64
<i>Equisetum arvense</i>	67%	40	20	60
<i>Solidago canadensis</i>	33%	40	40	40
<i>Cirsium arvense</i>	33%	20	20	20
<i>Galium aparine</i>	33%	8	8	8

Classification. This type is similar to the "grazing disclimax" Woods' rose community type described by Hansen et al. in Montana (1995) from central and eastern Montana and the *Rosa woodsii/Poa pratensis* community type in Nevada (Manning and Padgett 1989).

LAYER HEIGHT (ft) average min max

Redosier dogwood association

Cornus sericea association

NVC code: CEG001165

Plots 98RC242, 99CB1001, 99RC92, 99RC93, 99RC141, 99RC162, 99RC192

Location. This tall shrubland community is similar to a widespread type described throughout the western United States. It is found in the Columbia Basin, Okanogan Highlands, Blue Mountains, and in the Cascades of eastern Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	12.6	6.7	18.7
width of floodplain (ft)	113	7	351
entrenchment ratio	4.6	1.6	13.5
stream gradient (%)	2.7	0.5	10
Rosgen types	A1, C3, 2 C4, E5, E6		

Fluvial setting. In mountains of eastern Washington, this community occurs on active fluvial surfaces along Rosgen A and B streams and is associated with lakes and ponds. In the Columbia Basin, it was usually sampled in wide valleys (over 100 feet across) with less than 4% gradient. It was found in steeper and narrower valleys when associated with springs or intermittent streams. It has been observed along ponds and potholes elsewhere in the Columbia Basin. This community lines creeks well within the floodprone zone (FPI 0 to 0.8) along permanent streams and well above the floodprone zone (FPI 2.5) near an intermittent stream and a spring. It is associated with Rosgen stream types C3, C4, E5 and E6 with permanent streams 16-35 feet wide and on a 4-foot wide intermittent A1 stream type. Sites appear to flood annually but the surface is wet early in the growing season and probably dries to the water table (less than 2 feet) by late summer. Soils are usually fine textured and well-drained. The top 24 inches of soil at three sample sites did not contain Mottling and/or gleying layers. See representative stream profile S1 page 31.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.1	0.4	2.5
percent slope	10.8	1	55
position	4 floodplains, stream bank, second terrace		

PERCENT OF GROUND COVER			
litter	79	30	100
moss	0	0	0
bareground	19	0	70
gravel	1	0	5
cobble-boulder	0	0	1
bedrock	0	0	0
water	1	0	5

SOIL SURFACE HORIZON			
percent of coarse fragments (n=4)	0	0	0
texture	3 silt loam, sandy loam		

Vegetation. This community is a closed canopy shrub thicket dominated by a 10 to 20-foot tall redosier

dogwood layer. There is usually a shorter, sparse shrub layer of Wood's rose and golden current or snowberry. Sandbar willow may add to the thicket. Occasional short chokecherry trees are present. A patchy herbaceous layer is typically composed of stinging nettle, starry false solomonseal, sticky willy, cheatgrass, miner's lettuce, and seep monkeyflower. On similar drier sites and sites more heavily used by livestock, redosier dogwood is less dense and grazing increasers, such as reed canarygrass, Kentucky bluegrass, or Canadian thistle are common. This type often appears between wetter reed canarygrass and Woods' rose, black hawthorn, or aspen communities on drier fluvial surfaces. Management information applicable to this type is summarized in Hansen et al. (1995 page 357) and in Crowe and Clausnitzer (1997 page 152).

LAYER HEIGHT (ft)	average	min	max
Trees	7	0	20
Shrubs	10	4	15
Herbaceous	4	0	8

COMMON SHRUBS	n=6 cover			
	constancy	average	min	max
Trees	50%	5	3	8
Prunus virginiana	50%	4	1	8
Shrubs	100%	105	48	146
Cornus sericea	100%	73	30	100
Ribes aureum	67%	18	1	40
Rosa woodsii	67%	18	3	40
Symphoricarpos albus	33%	11	1	20
Clematis ligusticifolia	33%	6	3	8
Philadelphus lewisii	17%	1	1	1
Graminoids	100%	7	0	19
Phalaris arundinacea	50%	6	1	8
Bromus tectorum	50%	4	1	8
Elymus glaucus	17%	3	3	3
Forbs	100%	43	2	125
Urtica dioica	67%	16	3	30
Maianthemum stellatum	67%	5	1	13
Cirsium arvense	50%	5	1	8
Claytonia perfoliata ssp. perfoliata	50%	5	3	8
Heracleum maximum	33%	21	3	40
Galium aparine	33%	3	3	3

Classification. Two community types may be represented: the typical redosier dogwood low in the floodprone zone and a more forb rich community with higher cover of starry false solomonseal, miner's lettuce, snowberry on higher fluvial surfaces. Although blue wildrye is rare in samples, most plots appear floristically similar to the Oregon Natural Heritage Program (1999) creek (redosier) dogwood/blue wildrye association, although one or two plots appear similar to their creek (redosier) dogwood-chokecherry/prairie sage association. Overall this type is similar to the redosier dogwood association described by Crowe and Clausnitzer (1997) and Kovalchik (1992).

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Yellow willow/ redosier dogwood association

***Salix lutea* / *Cornus sericea* association**

NVC code: none

Plots 98RC142, 00RC142

Location. This tall shrubland is found in the Columbia Basin of eastern Washington. Locations are along Cow, Lake, and Rock Island creeks in Adams and Douglas counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	5.2	4.0	6.4
width of floodplain (ft)	254	7	500
entrenchment ratio	16.4	1.6	31.3
stream gradient (%)	1.8	0.5	3.0
Rosgen types	E6, G5		

Fluvial setting. This association was sampled in narrow and wide valleys with less than 3% gradient. It was sampled within and above the floodprone zone along permanent streams. Sites appear to flood annually but the surface is wet early in the growing season and probably dries to the water table (less than 2 feet) by late summer. There was no reoxidation layer in the top 18 inches of a sample site. Soils are usually fine textured. See representative stream profile T4 page 22.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.5	0	3
percent slope	17.5	5	30
Position	first terrace, channel shelf		

PERCENT OF GROUND COVER	average	min	max
Litter	55	10	100
Moss	0	0	0
Bareground	0	0	0
Gravel	0	0	0
cobble-boulder	0	0	0
bedrock	0	0	0
water	45	0	90

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0	0	0
texture	sandy clay loam, silty clay loam		

Vegetation. This community is a closed canopy shrub thicket dominated by a 10 to 20-foot tall redosier dogwood layer with yellow willow as a dominant or co-dominant. Usually a shorter, sparse shrub layer composed of Wood's rose, whitestem current and/or Sandbar willow add to the thicket. A patchy herbaceous layer is typically composed of stinging nettle, sticky willy, bentgrass, and cowparsnip. On similar drier sites and sites more heavily used by livestock, redosier dogwood is less dense and grazing increasers, such as reed canarygrass, Kentucky bluegrass, or Canadian thistle are common. Management information applicable to this type is summarized in Hansen et al. (1995 page 318).

LAYER HEIGHT (ft)	Average	min	max
Trees	12.5	0	25

Shrubs	14	8	20
Herbaceous	1.5	1	2

COMMON SHRUBS	n=2		cover	
	constancy	average	min	max
Trees	0%		0	0
Shrubs	100%	140	130	152
Salix lutea	100%	60	40	80
Cornus sericea	100%	40	40	40
Rosa woodsii	50%	30	30	30
Salix exigua	50%	20	20	20
Ribes inerme	50%	20	20	20
Salix bebbiana	50%	8	8	8
Symphoricarpos albus	50%	1	1	1
Ribes aureum	0%			
Clematis ligusticifolia	0%			
Philadelphus lewisii	0%			
Graminoids	100%	11	4	17
Agrostis stolonifera	100%	2	1	3
Phalaris arundinacea	50%	13	13	13
Poa pratensis	50%	3	3	3
Forbs	100%	35	24	45
Galium aparine	100%	5.5	3	8
Urtica dioica	100%	3	3	3
Heracleum maximum	50%	13	13	13
Claytonia perfoliata ssp. perfoliata	50%	3	3	3
Maianthemum stellatum	0%			

Classification. Overall, this type is similar to the redosier dogwood association described by Crowe and Clausnitzer (1997) and Kovalchik (1992) and maybe within the variation of that type (CEGL001165). Hansen et al. (1995) describe a yellow willow/ bluejoint reedgrass type that is similar. More samples are needed verify and fully described this type.



Yellow willow- Sandbar willow association

***Salix lutea* – *S. exigua* association**

NVC code: CEG0001197

Plots 98RC102, 98RC211, 00RC072, 00RC081, 00RC203

Location. This tall shrub community has been observed in several counties in eastern Washington. Samples are from Adams, Douglas, and Grant counties. It has not been sampled elsewhere.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	10.9	6.0	14.7
width of floodplain (ft)	241.6	13	1100
entrenchment ratio	11.0	1	45.8
stream gradient (%)	3.1	0.5	8
Rosgen types	A3, B3, B6c, C3, E6		

Fluvial setting. This community type was sampled in narrow to broad valleys with less than 3% valley gradient. This community was usually sampled low in the the floodprone zone and often associated with regulated hydrologic systems. Stream bank sites flood annually. Two samples are along an irrigation wasteway “stream” that captured a natural ephemeral streambed. This stream floods several times daily during irrigation season. Another channel is a ditched section of Cow Creek. All sites were on deep fine textured soils. See representative stream profile S5 page 32.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.2	-0.4	0.7
percent slope	16.7	0.5	70
Position	channel shelf, floodplain, gravelbar, first terrace, stream bank		

PERCENT OF GROUND COVER	average	min	max
Litter	60	0	100
moss	4	0	20
bareground	36	0	100
gravel	0	0	0
cobble-boulder	0.2	0	1
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=1)	0	0	0
texture	silt loam, sandy loam		

Vegetation. This is an open canopy tall shrub community with a 6 to 20-foot tall yellow and sandbar willow layer. There is a patchy herbaceous layer with bentgrasses, ryegrass, reed canarygrass and horsetail. Kentucky bluegrass, and Canadian thistle without willows cover the steep stream banks above the incised channel. Management information applicable to this type is summarized in Hansen et al. (1995 page 327) and in Crowe and Clausnitzer page 114.

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0

Shrubs	19	12	25
Herbaceous	3	0.1	7

COMMON SPECIES	n=5 cover			
	constancy	average	min	max
Trees	40%	5	1	8
Salix alba	20%	8	8	8
Betula occidentalis	20%	1	1	1
Shrubs	100%	88	43	129
Salix exigua	100%	44	8	90
Salix lutea	100%	40	8	100
Rosa nutkana	20%	20	20	20
Rosa woodsii	20%	1	1	1
Symphoricarpos albus	0%			
Graminoids	100%	62	2	127
Agrostis stolonifera	60%	40	30	50
Lolium arundinaceum	60%	15	3	30
Phalaris arundinacea	40%	25	20	30
Elytrigia repens var. repens	40%	7	1	13
Poa pratensis	20%	30	30	30
Forbs	100%	15	6	27
Equisetum laevigatum	40%	8	8	8
Equisetum arvense	40%	6	3	8
Epilobium ciliatum ssp. watsonii	40%	3	3	3
Mosses	20%	20	20	20

Classification. This is a proposed community type that is distinguished from the sandbar willow association by co-dominance of yellow willow, more bentgrass and horsetail, less reed canarygrass and angular coarse fragments, if any, in the soil profile. Two other plots clustered with this type in analysis: plot 99CB2404, which is dominated by sandbar willow with a trace of yellow willow and with cheatgrass dominant in the ground cover, and plot 00RC071, which is very similar to this type but with 10-20% cover of black cottonwood saplings. The Oregon Natural Heritage Program distinguishes three sandbar willow associations and with more sampling in Washington these or other types are likely to be recognized. This type is similar to the yellow willow type described by Hansen et al. (1995).



Sandbar or coyote willow association

***Salix exigua* association**

NVC code: CEGLO001197

Plots 98RC103, 98RC013, 99CB302, 00RC042, 00RC051

Location. This tall shrub community is similar to a type found across much of the western United States. It has been observed in all counties in eastern Washington. Samples are from Adams, Columbia, Douglas, Franklin, and Grant counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	15.0	6.3	30.8
width of floodplain (ft)	391	21	1100
entrenchment ratio	16.5	1.4	45.8
stream gradient (%)	1.4	0.5	3
Rosgen types	B1c, E5, E6, F2		

Fluvial setting. In the Blue Mountains, this association occurs on gravelly or cobbly alluvial bars and banks along Rosgen B, C and D stream types. These sites flood during spring runoff and water recedes by late spring. In the lowlands of eastern Washington, this type was sampled in broad valleys with less than 3% valley gradient. This community was low in the floodprone zone. One plot was subirrigated and occurred above the floodprone zone on a B1c stream type. Stream bank sites flood annually but the surface dries to the water table by late summer. All sites were on deep fine textured soils overlaying cobble gravels. Mottling and/or gleying layers were encountered at 6 inches and 28 inches at the only two sites sampled. See representative stream profile S6 page 32.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.3	-0.1	1.3
percent slope	14	2	30
position	2 channel shelves, first terrace, streambank		

PERCENT OF GROUND COVER	average	min	max
litter	59	40	90
moss	0	0	0
bareground	28	10	70
gravel	0	0	0
cobble-boulder	1	0	5
bedrock	0	0	0
water	10	0	40

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=3)	17	0	50
texture	silty clay loam, fine sandy loam, sand		

Vegetation. This is an open to closed canopy tall shrub community with a 6 to 20-foot tall sandbar willow layer that may have scattered yellow willow shrubs. There is a patchy herbaceous layer with reed canarygrass, quackgrass, bentgrasses and stinging nettle or thistles. Along Cow Creek, this type appeared between a wetter common spikerush community or the active channel and below pastures or fields on higher better drained surfaces. Management information applicable to this

type is summarized in Hansen et al. (1995 page 289) and in Crowe and Clausnitzer (1997 page 114).

LAYER HEIGHT (ft)	average	min	max
Trees	4	0	15
Shrubs	4	0	10
Herbaceous	5	1	8

COMMON SPECIES	n=5 constancy	Cover		
		average	min	max
Trees	50%	3	3	3
Juglans nigra	25%	1	1	1
Elaeagnus angustifolia	25%	1	1	1
Betula occidentalis	0%			
Shrubs	100%	46	23	80
Salix exigua	100%	36	20	80
Salix lutea	50%	1	1	1
Symphoricarpos albus	25%	1	1	1
Clematis ligusticifolia	25%	1	1	1
Rosa woodsii	0%			
Graminoids	100%	72.5	41	103
Phalaris arundinacea	100%	53	30	100
Elytrigia repens var. repens	50%	1	1	3
Poa pratensis	50%	1	1	3
Agrostis stolonifera	0%			
Forbs	100%	23.5	0	58
Cirsium arvense	50%	1	1	1
Cardaria draba	25%	20	40	40
Veronica anagallis-aquatica	25%	7	13	13
Equisetum arvense	25%	4	8	8
Mosses	0%			

Classification. This community currently describes sandbar willow communities on annually flooded gravel bars and those on less frequently flooded streambanks with fine textured soils. It might be better classed as sandbar willow/reed canarygrass as described on the Hanford Reach of the Columbia by Salstrom and Easterly (1995). The Oregon Natural Heritage Program distinguishes three sandbar willow associations and with more sampling in Washington these or other types are likely to be recognized. This type is similar to the Sandbar willow association described by Crowe and Clausnitzer (1997) and Hansen et al. (1995).



**Mockorange / Common snowberry plant association
Philadelphus lewisii / *Symphoricarpos albus* plant
 association**

NVC code: CEG L001170

Plots 98RC063, 99CB601, 99CB801, 00RC174

Location. This plant association is found across Washington's Columbia Basin. It was sampled in Adams, Garfield, Douglas and Walla Walla counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	29.4	10.9	60
width of floodplain (ft)	26.2	6.7	47
entrenchment ratio	1.4	1.1	1.6
stream gradient (%)	2.1	0.5	3
Rosgen types	B2, G4, F3b, F3		

Fluvial setting. This association occurs primarily on fluvial surfaces along intermittent and perennial streams. These samples are from 30 to 100-foot wide valleys with 1-5% gradients and streams 6 to 20 feet wide. This association usually appears above or high in the floodprone zone. Surface soils are typically coarse textured, often with a high frequency of coarse fragments. No reoxidation layer was detected in the top 18 inches of two sample sites. See representative stream profiles T1 page 22 and S2 page 31.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.0	0.5	4.8
percent slope	27	1	60
position	2 floodplains, streambank, second terrace		

PERCENT OF GROUND COVER	average	min	max
litter	56	10	90
moss	1	0	5
bareground	35	10	70
gravel	5	0	10
cobble-boulder	3	0	10
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	25	0	60
texture	2 silty clay loam, sandy loam, silty loam		

Vegetation. This is a 6 to 20-foot tall shrub community dominated by mockorange. Common chokecherry can be present in the tall shrub layer. A short shrub layer of snowberry appears with blue wildrye, Kentucky bluegrass, cheatgrass and in one stand with an abundance of quackgrass. Forbs average 24% cover and are composed of a variety of species. Annuals are present on sites and can be abundant in patches. Bareground, exposed gravel and rock may be as abundant as litter on the ground surface. It is surrounded by upland vegetation of annual grasses or Idaho fescue - bluebunch wheatgrass or sparsely vegetated talus or bedrock. This type appears between the channel or reed canarygrass and black cottonwood or boxelder forest on fluvial surfaces or upland. Management information is not

available, pertinent information on key species appears in Table 3.

LAYER HEIGHT (ft)	average	min	max
Trees	5	0	20
Shrubs	5	0	10
Herbaceous	2	1	4

COMMON SPECIES	n=4	cover		
	constancy	average	min	max
Trees	50%	9	3	14
Prunus virginiana	50%	7	3	10
Populus balsamorhiza ssp. trichocarpa	25%	3	3	3
Shrubs	100%	49	15	122
Philadelphus lewisii	100%	23	10	60
Symphoricarpos albus	100%	6	1	10
Clematis ligusticifolia	50%	17	13	20
Rosa nutkana	25%	50	50	50
Toxicodendron rydbergii	25%	30	30	30
Artemisia ludoviciana	25%	8	8	8
Ribes aureum	25%	3	3	3
Rosa woodsii	25%	1	1	1
Graminoids	100%	50	15	130
Bromus tectorum	75%	16	8	30
Elymus glaucus	75%	10	3	15
Phalaris arundinacea	50%	9	8	10
Poa palustris	50%	7	3	10
Poa pratensis	50%	6	1	10
Forbs	100%	24	10	52
Lactuca serriola	50%	7	1	13
Cirsium arvense	50%	1	1	1
Equisetum laevigatum	25%	30	30	30
Mosses	50%	10	10	10

Classification. This is included in Johnson and Clausnitzer (1987) "garland" vegetation. One stand was included in the Lewis' mockorange / poison-ivy association by Crawford (1998), now named the serviceberry/ poison-ivy association.



Saskatoon serviceberry – Lewis' mockorange / bluebunch wheatgrass community type
***Amelanchier alnifolia* – *Philadelphus lewisii* / *Pseudoroegneria spicata* community type**
 NVC code: none

Plots 99RC021, 00RC043, 00RC044, 00RC092

Location. This deciduous shrubland community has been observed throughout the Columbia Basin. Currently, it is represented with plots in Douglas and Lincoln counties.

STREAM CHARACTERISTICS	average	min	Max
width:depth ratio	20.4	6.0	30.8
width of floodplain (ft)	29	2	52
entrenchment ratio	1.4	1.3	1.4
stream gradient (%)	4.8	3	7
Rosgen types	2 A3, F2		

Fluvial setting. It occurs on toeslopes, cliff garlands, and fluvial surfaces along streams. This was sampled in narrow canyons with 4 to 6% gradients. Streams are moderate to steep gradient. Surfaces were generally well above the floodprone zone although one plot was in the upper floodprone zone. Soils are coarse-textured and well drained. See representative stream profile S7 page 32.

FLUVIAL SURFACE	average	min	Max
flooding potential index (FPI)	2	0.4	3
percent slope	11.25	5	20
Position	floodplain, first terrace, second terrace, toeslope		

PERCENT OF GROUND COVER	average	min	Max
Litter	43	20	70
Moss	13	0	30
Bareground	16	5	30
Gravel	13	10	15
Cobble-boulder	28	13	40
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON	average	min	Max
percent of coarse fragments (n=4)	25	0	50
texture	2 sand, sandy loam, silt loam		

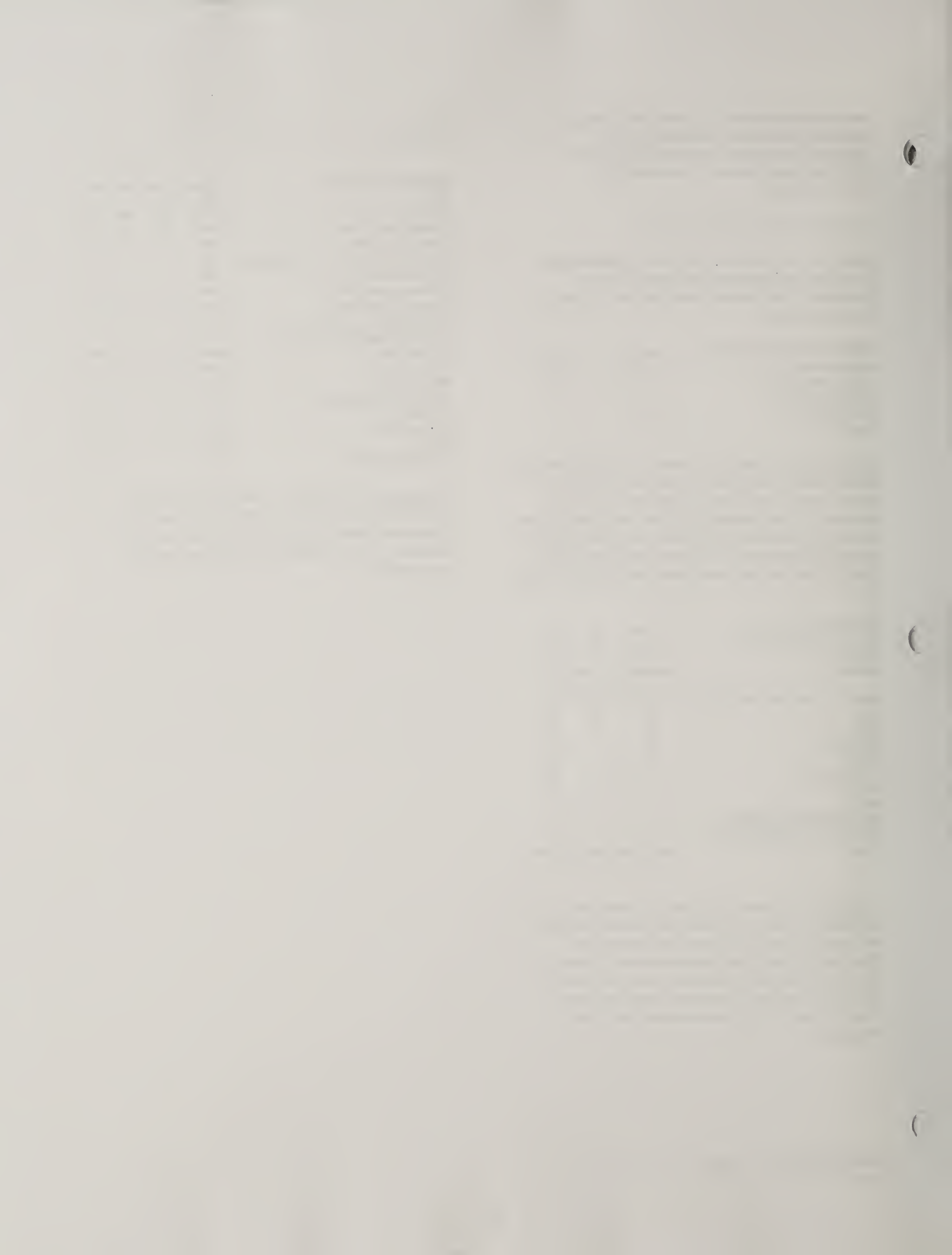
Vegetation. This is a 6 to 12-foot tall shrub dominated community with Lewis' mockorange and/or Saskatoon serviceberry cover of 13% and 30%, respectively. Wyoming big sagebrush frequently occurs in these dry riparian types from the adjacent upland. Bluebunch wheatgrass, Sandberg's bluegrass (including alkali bluegrass) and western yarrow usually occur with cheatgrass.

Shrubs	9	6	12
Herbaceous	1	1	2

COMMON SPECIES	n=4 cover			
	constancy	average	min	max
Trees	0%			
Shrubs	100%	50	19	103
<i>Amelanchier alnifolia</i>	50%	42	13	70
<i>Philadelphus lewisii</i>	50%	35	30	40
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	75%	11	1	30
<i>Eriogonum niveum</i>	50%	7	1	13
<i>Clematis ligusticifolia</i>	50%	2	1	3
<i>Artemisia ludoviciana</i>	25%	30	30	30
<i>Ribes cereum</i> var. <i>cereum</i>	25%	3	3	3
<i>Artemisia tridentata</i> ssp. <i>tridentata</i>	25%	3	3	3
Graminoids	100%	42	20	81
<i>Bromus tectorum</i>	100%	26	3	50
<i>Poa secunda</i>	75%	8	8	8
<i>Pseudoroegneria spicata</i>	75%	3	3	3
<i>Poa bulbosa</i>	50%	12	3	20
<i>Leymus cinereus</i>	50%	3	3	3
Forbs	100%	10	3	25
<i>Achillea millefolium</i>	75%	1	1	1

Classification. This type is related to the Saskatoon serviceberry community described by Crowe and Clausnitzer (1997). Johnson and Clausnitzer (1987) included similar communities in the talus garland communities.

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0



White sagebrush community type
***Artemisia ludoviciana* community type**
 NVC code: none

Plots 98RC131, 99CB1301, 99CB2201, 99RC11, 99RC30, 99RC154, 00RC091

Location. This is a widespread community type in the Columbia Basin of Idaho, Oregon and Washington. It was sampled in Adams, Asotin, Douglas, and Lincoln counties and has been observed in all dryland counties in Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	33.7	14	60
width of floodplain (ft)	35	5	107
entrenchment ratio	1.7	1	4
stream gradient (%)	3.4	1	7
Rosgen types	A3, C3, D3, F3, 2 F3b, G3		

Fluvial setting. This community is found at low elevations in arid lands on alluvial terraces along intermittent and permanent streams. It can occur in cobbly overflow channels of perennial streams and in ephemeral streams. It was sampled at or near bankfull and above the floodprone zone. Sites may not flood annually. These surfaces appear to be frequently scoured by floods. Rock and gravel occupied 15-70% of soil surfaces. Litter and plant basal area exhibit as much cover as bareground. Surface soils are sandy with high abundance of coarse fragments. Soils are gravelly to rocky and well drained. See representative stream profiles S3 page 31 and G2 page 59.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.7	-1.0	3.1
percent slope	10.5	1	60
position	2 floodplains, abandon channel, streambank, 2 intermittent channels, first terrace		

PERCENT OF GROUND COVER	average	min	max
litter	26	14	45
moss	0	0	2
bareground	24	3	40
gravel	23	10	40
cobble-boulder	23	0	50
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	68	60	90
texture	2 gravel/cobble, sand, sandy loam, silt loam, sandy clay loam		

Vegetation. White sagebrush is always present displaying 8-40% cover. It appears with a variety of herbaceous plants. Cheatgrass, quackgrass and western yarrow occurred in more than half of the samples and were abundant in an overflow channel of a perennial stream. Vegetation is sparse to closed with its total cover and composition varies throughout the growing season, as well as, year to year. When this community is outside

the floodprone zone, it appears to be early seral to mockorange or other woody plant dominated communities. Management information is not available. These sites produce little forage.

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	2	0	6
Herbaceous	2	1	2

COMMON SPECIES	n=7 cover			
	constancy	average	min	max
Trees	14%	1	1	1
Populus balsamorhiza ssp. trichocarpa	14%	1	1	1
Shrubs	100%	18	8	40
Artemisia ludoviciana	100%	18	8	40
Philadelphus lewisii	29%	1	1	1
Artemisia tridentata ssp. tridentata	14%	8	8	8
Eriogonum heracleoides	14%	3	3	3
Eriogonum niveum	14%	1	1	1
Graminoids	100%	34	4	68
Bromus tectorum	86%	7	1	20
Elytrigia repens var. repens	57%	15	1	50
Poa compressa	43%	2	1	3
Poa secunda	29%	11	8	13
Polypogon monspeliensis	29%	1	1	1
Leymus cinereus	29%	2	1	3
Agrostis interrupta	29%	8	3	13
Poa bulbosa	29%	11	1	20
Muhlenbergia richardsonis	29%	3	3	3
Pseudoroegneria spicata	14%	1	1	1
Elymus lanceolatus	14%	13	13	13
Elymus glaucus	14%	1	1	1
Phalaris arundinacea	14%	1	1	1
Forbs	100%	50	27	78
Achillea millefolium	86%	1	1	1
Epilobium minutum	43%	5	1	13
Dipsacus fullonum ssp. sylvestris	43%	2	1	3
Lactuca serriola	43%	2	1	3
Chenopodium album	43%	2	1	3
Convolvulus arvensis	29%	31	1	60
Grindelia squarrosa	29%	7	1	13
Mosses	14%	1	1	1

Classification. This community is often observed but rarely sampled. This type was described by Moseley (1998) in Idaho, Crawford (1998 1 plot) and the Oregon Natural Heritage Program (1999 2 plots). Crawford (1999) delineated a Louisiana sagewort / sticky willy (*Artemisia ludoviciana* / *Galium aparine*) community type. Additional plot data and analysis did not support that distinction.



Netleaf hackberry / mockorange community type
Celtis occidentalis var. *reticulata* / *Philadelphus lewisii*
community type
 NVC code: none

Plots 99CB0102, 99CB901, 99CB1801, 99CB2302

Location. Netleaf hackberry is limited to southeastern Washington and the eastern Columbia River Gorge. This deciduous shrubland community is similar to a poorly described type observed in southeastern Washington and adjacent Oregon and was sampled in Asotin, Garfield, and Whitman counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	31.4	11.7	46
width of floodplain (ft)	32.8	7	68
entrenchment ratio	1.5	1.0	2.1
stream gradient (%)	6.7	2	13
Rosgen types	A3a, B3, F3b		

Fluvial setting. It occurs on fluvial surfaces along intermittent and permanent streams. It was sampled in narrow canyons with moderate to steep stream gradients. Sites appear above the floodprone zone. See representative stream profile S8 page 32.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	3.9	1.0	8.9
percent slope	11.7	5	15
Position	floodplain, 2 first terraces		

PERCENT OF GROUND COVER	average	min	max
Litter	57	30	95
Moss	7	0	20
Bareground	23	5	60
Gravel	0	0	0
cobble-boulder	3	0	10
Bedrock	10	0	30
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0	0	0
texture	silty clay loam, sandy clay loam		

Vegetation. This is a closed to open tree community dominated by netleaf hackberry that rarely exceeds 20 feet in height. Common chokecherry can be part of the short tree canopy. Lewis' mockorange is always present and clearly dominates the shrub layer. It, along with blue elderberry, can merge with the short tree layer. Poison-ivy and smooth sumac are common associates in the shrub layer. Annual grasses are usually present on sites and can be abundant in patches.

LAYER HEIGHT (ft)	average	min	max
Trees	13	12	15
Shrubs	11	10	12

COMMON SPECIES	n=3			
	constancy	cover average	min	max
Overstory trees	100%	73	60	80
<i>Celtis laevigata</i> var. <i>reticulata</i>	100%	73	60	80
Understory trees	100%	40	11	80
<i>Celtis laevigata</i> var. <i>reticulata</i>	100%	17	10	30
<i>Prunus virginiana</i>	33%	70	70	70
Shrubs	100%	63	25	83
<i>Philadelphus lewisii</i>	100%	30	10	70
<i>Sambucus nigra</i> ssp. <i>cerulea</i>	100%	5	1	10
<i>Toxicodendron rydbergii</i>	100%	4	1	10
<i>Rhus glabra</i>	67%	6	1	10
Graminoids	100%	64	12	160
<i>Bromus tectorum</i>	100%	43	10	100
<i>Poa pratensis</i>	33%	40	40	40
Forbs	100%	20	10	34
<i>Cynoglossum officinale</i>	100%	3	3	3
<i>Claytonia perfoliata</i> ssp. <i>perfoliata</i>	100%	2	1	3
<i>Galium aparine</i>	67%	2	1	3
<i>Urtica dioica</i>	67%	2	1	3
Mosses	33%	10	10	10

Classification. This is an undescribed community type although Miller (1976) discusses a "non-riparian community" adjacent to white alder riparian forest "comprised of *Celtis reticulata* stands overtopping *Philadelphus lewisii*, *Rosa woodsii* and *Bromus tectorum*." Miller's community is likely the same high terrace community type as described here.



Miscellaneous Short Tree and Shrub Types.

Thinleaf alder/yellow willow community type

Alnus incana / *Salix lutea* community type

NVC code: none

Plot 00RC141

This association was sampled on Badger Mountain in Douglas County and is possible elsewhere in the Columbia Basin. The community was sampled above the floodprone zone (FPI 3) on the first terrace along a 3% gradient perennial stream. It was associated with Rosgen stream type G3. This is an open canopy forest type with a 30-foot tall thinleaf alder layer (40% cover) over an 8-foot tall shrub layer. Yellow willow, Wood's rose, whitestem gooseberry and common snowberry form a closed shrub layer with few herbaceous species. Sweetcicely, cowparsnip, and enchanter's nightshade are common forbs on site. This is similar to the thinleaf alder/ common snowberry shrubland type (CEGL001153) from streams in the mountains of eastern Oregon (Kovalchik 1987; Crowe and Clausnitzer 1997) and Washington (Kovalchik 1992) but lacks redosier dogwood and several species more associated with montane zones. More samples of this community are needed assess its relationship to other types or to fully describe its ecological characteristics in Washington.

Water birch / mockorange community type

Betula occidentalis / *Philadelphus lewisii* community type

NVC code: CEGL001080

Plot 99CB1201

This short woodland/tall shrubland community is similar to a type recognized in Oregon and Idaho. It was sampled in Asotin County and could be found in other Washington counties with coulees and associated flood topography. The plot was located in a 30 to 100-foot wide valley with 1-3% gradient. This sample appeared above the floodprone zone (FPI 1.8) along an intermittent, A6a Rosgen stream type. Surface soil was a sandy clay loam and was 12 inches thick.

This community appears as a closed short tree layer (35 feet tall) of water birch and black hawthorn over a shrub thicket dominated by a 6-foot tall mockorange and shorter water birch layer. A sparse, patchy herbaceous layer with Fuller's teasel, common burdock, purple sweet-cicely and other common forb species of disturbed understories occurred on this site. This type appeared between the channel and an upland bunchgrass community. This type is included in a generalized mockorange type described by Evans (1989). It is similar to the water birch-mockorange/western clematis association described by the Oregon Natural Heritage Program (1999) although their's was associated with

larger, perennial streams. It may be either a later seral stage of a black cottonwood/ mockorange type or a white alder/ mockorange type. It is now included in the provisional water birch riparian type. Management information applicable to this type is summarized in Hansen et al. (1995) Montana Riparian Guide page 356.

Common chokecherry community type

Prunus virginiana community type

NVC code: none.

Plot 99CB900

This riparian type is likely in several Columbia Basin counties but has only been sampled in southeastern Washington. This stand has an unclear affinity to other plots in the current database although it is tentatively included within the type recognized by Evans (1989). This stand was at bankfull on a Rosgen A6 intermittent stream in southeast Washington. It has a 10-foot tall chokecherry and sandbar willow shrub layer with a conspicuous blue wildrye layer with trailing blackberry. This community was in the channel with a netleaf hackberry community on the adjacent fluvial surface.

Saskatoon serviceberry/western poison ivy community type

Amelanchier alnifolia / *Toxicodendron rydbergii* community type

NVC code: none

Plots 98RC201, 98RC234

This deciduous shrubland community is similar to a poorly described type observed in eastern Washington and Oregon. It occurs on toeslopes, cliff garlands, and fluvial surfaces along intermittent streams. In Adams County, it was sampled in narrow canyons with moderate to steep stream gradients and on a permanent and spring stream. Sites are on steep slopes (10-60%). Sites appear above the floodprone zone (FPI 3.5 and 7.5) but are likely to be subirrigated since both sites are associated with intermittent springs. Soils are coarse-textured and well drained.

This is a 6 to 20-foot tall shrub thicket dominated by serviceberry. Woods' rose and western white clematis are common associates in the shrub layer. Stands had a short dense layer of western poison ivy. Annual grasses are present on sites and can be abundant in patches. Blue wildrye is present in both stands. Average forb cover is 10% and is composed of a variety of species. This type also appeared above a narrow intermittent channel with watercress and on a toeslope above reed canarygrass and basin wildrye communities. It was surrounded by upland vegetation of annual grasses or Idaho fescue - bluebunch wheatgrass or sparsely vegetated talus or bedrock. This type is similar to the Saskatoon serviceberry community described by Crowe and Clausnitzer (1997). It was



called the Lewis' mockorange / poison-ivy association by Crawford (1998). The Oregon Natural Heritage Program describes a similar association, called Saskatoon serviceberry/elk sedge, found at higher elevations.

Boxelder woodlands

***Acer negundo* community type**

NVC code: none

Plots 98RC0023, 99CB202, 99CB802

Boxelder is located in southeastern Washington along streams in the Palouse region and in tributary valleys of the Snake and the in eastern Columbia River gorge. Boxelder is native to North America but an introduced species in Washington. This type occurs in broader valleys with very low to moderate gradients. The community was sampled within the floodprone zone (FPI 0.5) on a regulated stream and well above the floodprone zone (FPI 3 to 7) along a spring stream and an unregulated intermittent stream. It is associated with Rosgen stream types E5, F3B and G6. Soils are wet near the surface for only a short period early in the growing season. The upper soil horizon is silt loam to silty clay loam and densely intermingled with roots.

This is a closed to open short woodland or tall shrubland type that is 50-100 feet tall and dominated by introduced, often planted, exotic broadleaf trees. Boxelder is found in all stands and often a dominant or a co-dominant with taller exotic trees, such as black walnut, honey locust, and white poplar. Black cottonwood is an occasional native tree. Sandbar willow and chokecherry are common native tall shrubs in this community. Grasses and forbs contribute equally to the undergrowth providing around 40% cover each. Poison hemlock may be a most obvious herbaceous species in the community although cheatgrass and stinging nettle are more consistently abundant. Black hawthorn might be expected on similar sites. This community generally appears between wetter reed canarygrass or quackgrass communities and upland basin wildrye or smooth sumac communities or wheat fields. Boxelder is an introduced species in Washington and has been widely planted and locally naturalized (escaped) along streams in the arid west. This type is an undescribed, non-native vegetation type. Evans (1989) noted that this type is uncommon in the Columbia Basin. It has been observed on lower Rock Creek in Adams and Whitman counties and along Rock Creek in Klickitat County. This is similar to a native boxelder/ chokecherry community described in Montana (Hansen et al. 1995). Management information is unavailable.

White willow woodlands

***Salix alba* community type**

NVC code: none

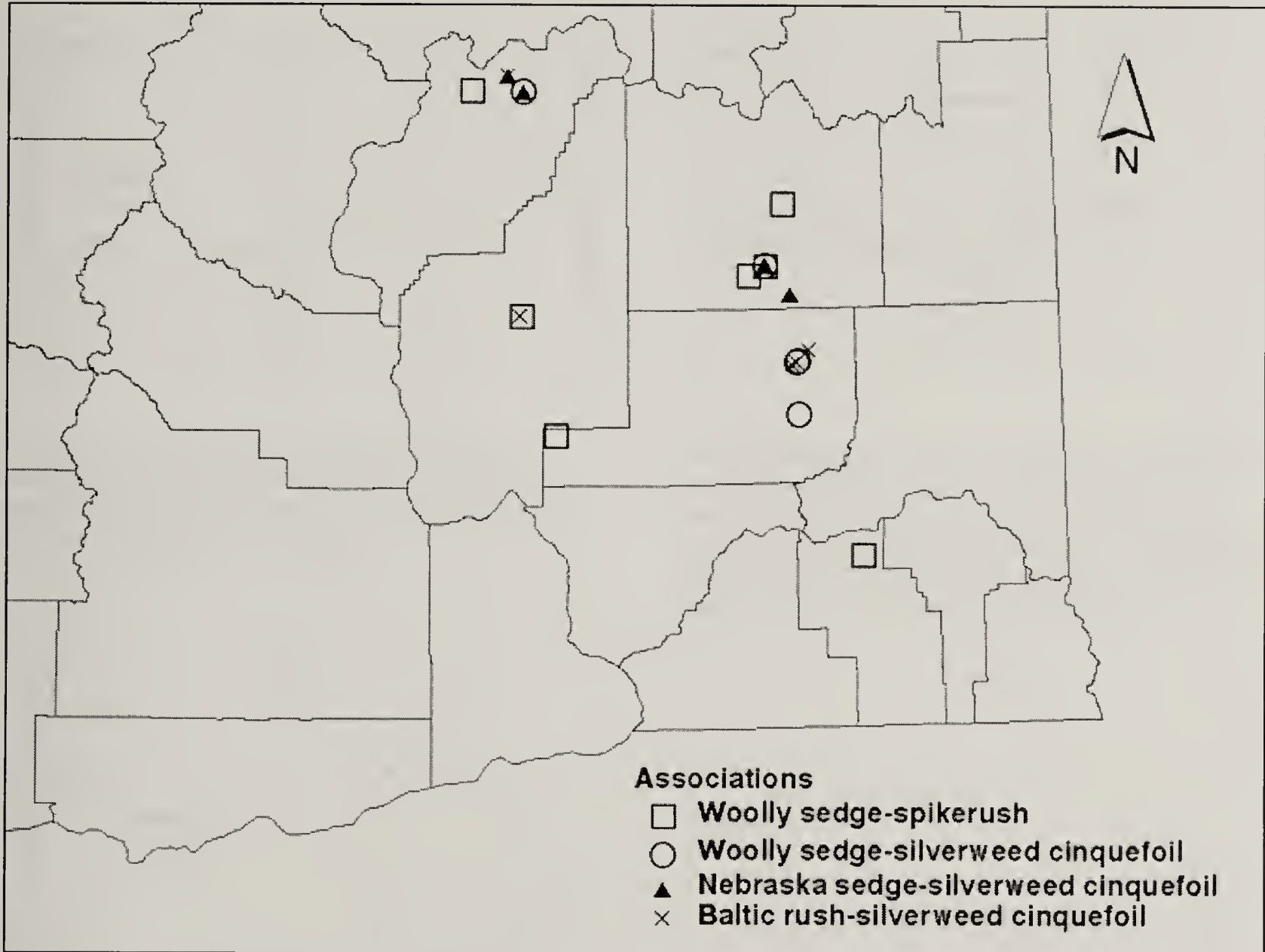
Plots 99CB1902, 99CB702

This type was observed but was not sampled in Lincoln County. Sample locations are located along streams in the Palouse Prairie and in tributaries into the Snake and Columbia Rivers. This type occurs in broader valleys with very low to moderate gradients. The community was sampled well above the floodprone zone (FPI 4-8) along a spring and a permanent stream. Observations in the upper Crab Creek and Cow Creek drainages are of large white willow trees near bankfull on regulated and unregulated permanent streams. It is associated with Rosgen stream type B6 in southeast Washington. The upper soil horizon is a silty clay loam and densely intermingled with roots.

This is a closed to open canopy forest or woodland type that is over 30 feet tall and dominated by the introduced, often planted, exotic broadleaf tree, white willow. Exotic grasses, such as cheatgrass, Kentucky bluegrass, reed canarygrass, and bentgrass are a dominant feature of the understory with over 50% cover. Canadian thistle or various weedy annuals may be present. This community generally appears between wetter reed canarygrass or the channel and upland basin wildrye or agricultural fields. White willow is an introduced species in Washington that has been widely planted and locally naturalized (escaped) along streams in the arid west. It is often confused with the native whiplash willow (*Salix lucida* var. *caudata*). This type is an undescribed, non-native vegetation type.

Grass-like Wet Meadow and Riparian Vegetation Types

Plot locations

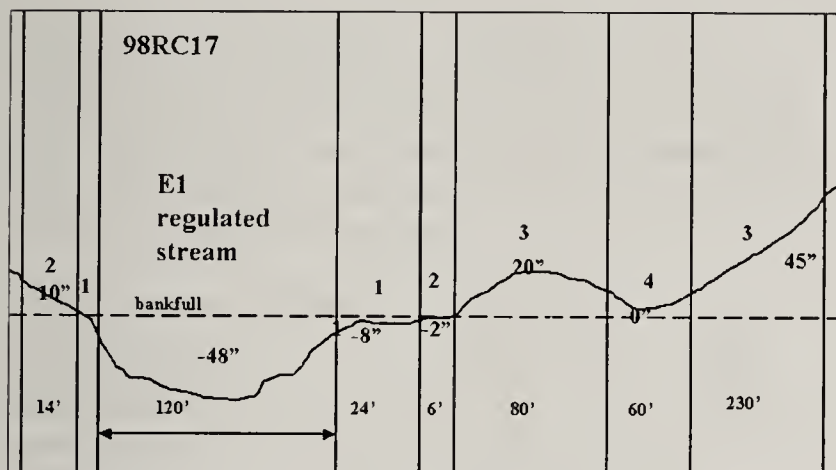




Grass-like Wet Meadow and Riparian Vegetation Types

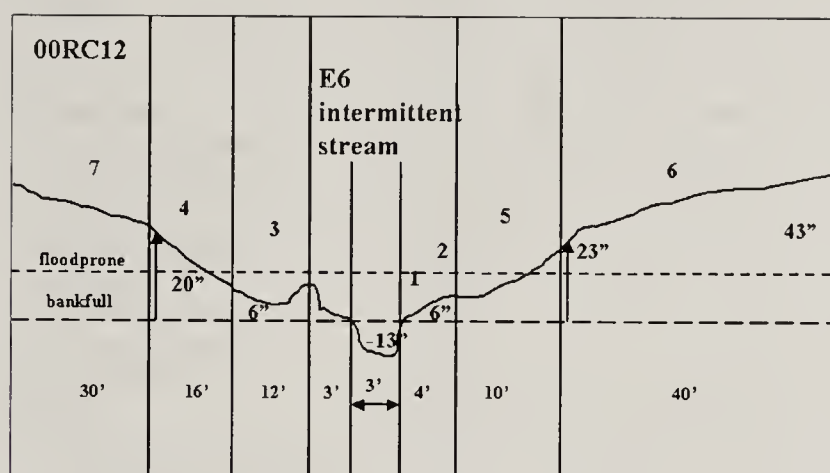
Selected stream profiles

L1



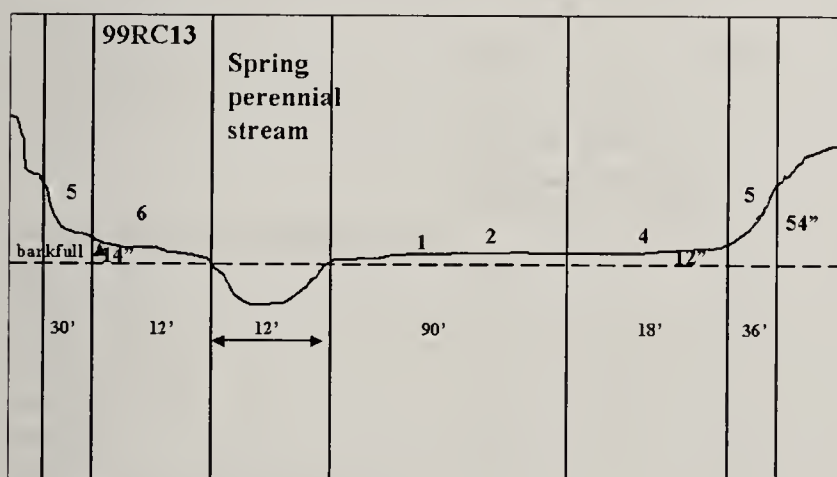
Stream and riparian vegetation profile at Finnel Lake, Adams County. 1= common spikerush, 2= Baltic rush – silverleaf cinquefoil, 3= saltgrass – clustered field sedge, and 4= annual hairgrass vernal pond.

L2



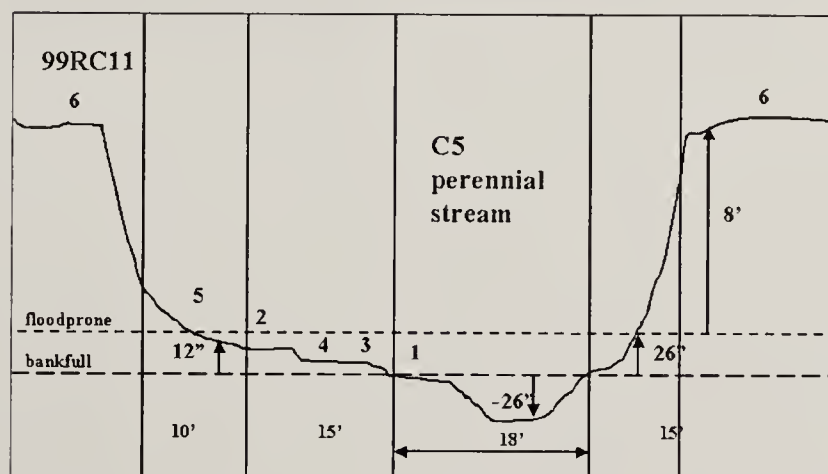
Stream and riparian vegetation profile on east Foster Creek, Douglas County. 1= common spikerush, 2= woolly sedge-silverweed cinquefoil, 3= Nebraska sedge-silverweed cinquefoil, 4= basin wildrye – clustered field sedge, and 5= Baltic rush, 6= saltgrass – clustered field sedge, and 7= black greasewood/ saltgrass.

L3

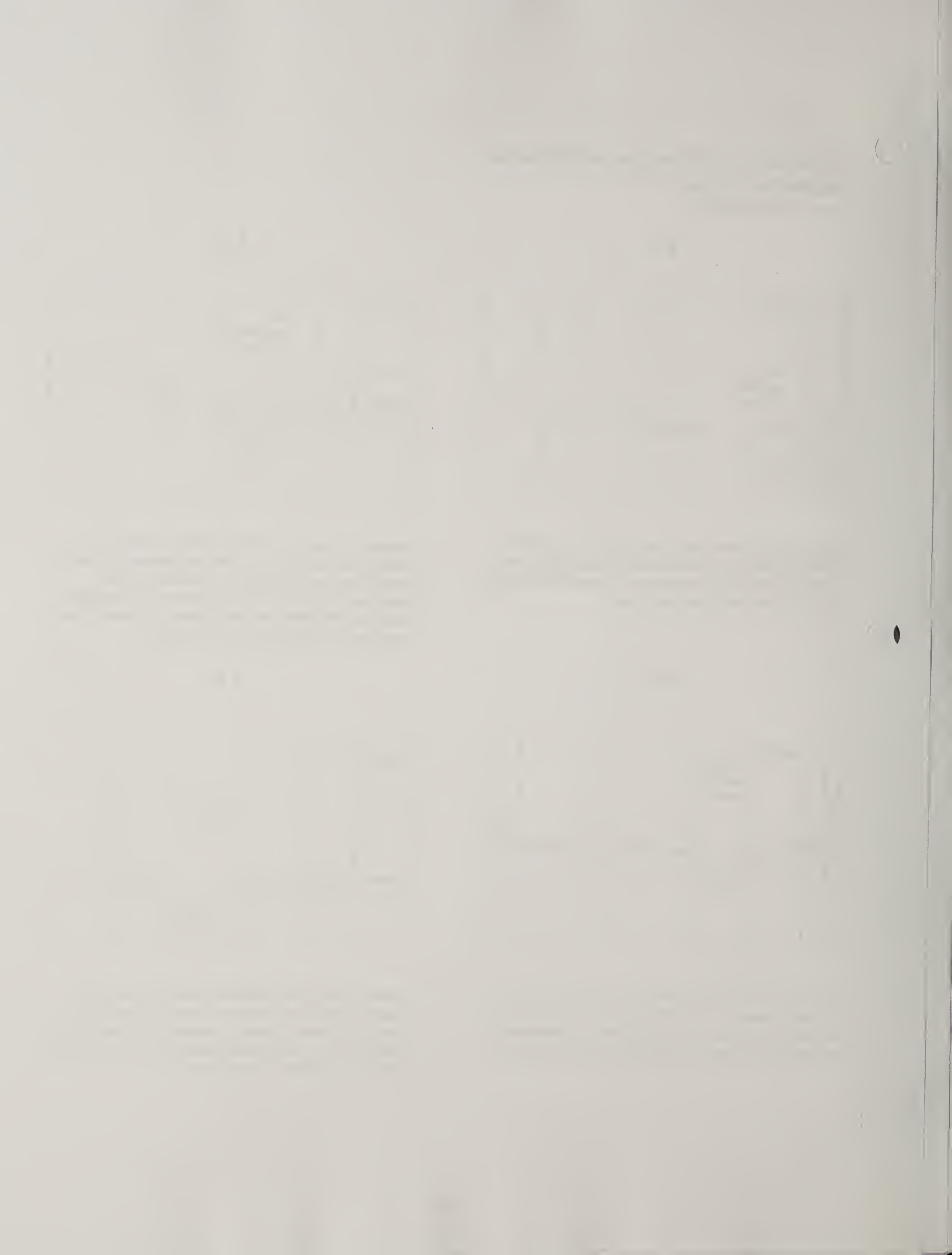


Stream and riparian vegetation profile near Rocklyn, Lincoln County. 1= woolly sedge – common spikerush, 2= tufted hairgrass, 4= Nebraska sedge - silverweed cinquefoil, 5= Kentucky bluegrass, and 6= Baltic rush.

L4



Stream and riparian vegetation profile at Coal Creek, Lincoln County. 1= reed canarygrass, 2= common horsetail, 3= woolly sedge – common spikerush and 4= Nebraska sedge - silverweed cinquefoil, 5= Baltic rush, and 6= basin wildrye - cheatgrass.



Grass-like Wet Meadow and Riparian Vegetation Types

Hard-stem bulrush – Broadleaf cattail association

Schoenoplectus acutus– *Typha latifolia* association

NVC code: CEG0001840

Plots 98RC052, 98RC161, 98RC222, 99RC211, 99CB503, 00RC031, 00RC211

Location. This herbaceous community is found throughout the United States. It has been observed in Adams, Lincoln, Grant, Benton and Yakima counties in the Columbia Basin and is described in the mountains of eastern Washington. Samples are from Adams, Lincoln, Columbia, and Grant counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	36.6	8.3	93.8
width of floodplain (ft)	514	15	1500
entrenchment ratio	12.4	1.1	53.6
stream gradient (%)	0.9	0.0	3.0
Rosgen types	B1, C6, 2 E6, 2 F1,F3		

Fluvial setting. This community is associated with river and lake shorelines prone to yearly flooding and with soils that often stay flooded throughout the growing season. It was sampled in valleys over 300 feet wide with 1% or less gradients. It occurs at or below bankfull. This community was sampled on streambanks and muddy point bars associated with slow-moving perennial streams and reservoirs, ponds or lakes. Soils typically have high organic content in surface layers and are associated with trapped fine-textured mineral particles. All sites were flooded at the time of sampling.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.1	-0.3	0.8
percent slope	0.9	0	3
position	2 channel shelves, floodplain, gravelbar, 2 streambanks, lake edge		

PERCENT OF GROUND COVER	average	min	max
litter	33	5	59
moss	0	0	0
bareground	17	0	40
gravel	0	0	1
cobble-boulder	0	0	0
bedrock	0	0	0
water	50	0	80

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=3)	0	0	0
texture	2 hemic, silt loam		

Vegetation. This is a dense herbaceous community dominated by 10-foot tall hard-stem bulrush, an aggressive rhizomatous species. Hard-stem bulrush can be the only species present. Broadleaf cattail is a common associate and forms a transition to pure cattail-dominated communities. It is adjacent to the channel and wet meadow or salt meadow communities. Management information applicable to this type is summarized in Hansen et al. (1995 page 448) merged

with soft-stem bulrush communities.

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	0	0	2
Herbaceous	9	2.5	11

COMMON SPECIES	n=7	cover		
	constancy	average	min	max
Trees	29%	1	1	1
Salix alba	14%	1	1	1
Shrubs	29%	1	1	1
Salix exigua	29%	1	1	1
Graminoids	100%	54	3	100
Schoenoplectus acutus	86%	54	3	98
Phalaris arundinacea	43%	7	1	20
Juncus balticus	29%	16	1	30
Scirpus microcarpus	14%	3	3	3
Poa pratensis	14%	1	1	1
Eleocharis palustris	14%	1	1	1
Carex utriculata	0%			
Glyceria striata	0%			
Forbs	86%	63	0	106
Typha latifolia	71%	56	20	90
Veronica anagallis-aquatica	29%	3	3	3
Polygonum hydropiperoides	29%	2	1	3
Lythrum salicaria	29%	2	1	3
Typha angustifolia	14%	40	40	40

Classification. *Schoenoplectus acutus* is the current synonym for *Scirpus acutus* in Hitchcock and Cronquist (1973). Crawford (1998) incorrectly reported this as soft-stem bulrush (*S. tabernaemontani*). This community is often merged with broadleaf cattail and/or soft-stem bulrush communities. This summary includes a narrowleaf cattail community found along a "tidal" environment a reservoir edge. Pure stands of broadleaf cattail are classified western broadleaf cattail association (NVC code CEG002010).

Northwest Territory sedge association
***Carex utriculata* association**
 NVC code: CEG0001562

Plots 98RC150, 98RC151, 99RC212

Location. This sedge-dominated community is similar to a type found throughout the interior western United States. It has been described across Washington and is likely appear in all the dryland counties in eastern Washington where ever appropriate environments occur. Samples are from Adams and Lincoln counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	194.2	82.5	250
width of floodplain (ft)	133.3	25	350
entrenchment ratio	1	1	1.1
stream gradient (%)	0	0	0
Rosgen types	Spring , F1		

Fluvial setting. In the montane forest landscape of eastern Washington and Oregon, this community appears in wet basins, springs and floodplains along Rosgen C, E and F stream types. These sites are very wet sites and remain saturated well into the growing season. In the Columbia Basin of Washington, it was sampled in a spring-fed fen and along a spring feed reach of an intermittent stream. The soil surface is submerged much of the year and covered by litter. Soils are organic. One sample displayed a gleyed horizon at 5 inches below the surface organic horizon.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.6	-0.2	5.0
percent slope	0.3	0.0	1.0
position	spring/seep, lake edge		

PERCENT OF GROUND COVER	average	min	max
litter	73	50	100
moss	0	0	0
bareground	0	0	0
gravel	0	0	0
cobble-boulder	0	0	0
bedrock	0	0	0
water	27	0	50

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=3)	0	0	0
texture	2 hemic, silty clay loam		

Vegetation. This dense sedge community can be 2 to 3 feet tall. Northwest territory sedge dominates the community with more than 25% cover. In the inland Pacific Northwest, it forms several plant communities with a variety of willows. The willows may decrease or locally disappear with severe grazing or flooding. Reed canarygrass is common to abundant on more disturbed sites. Forb diversity is generally low and provides little cover. All sample sites in the Columbia Basin contained reed canarygrass, cattail, and swamp smartweed. Adjacent communities are bulrush, cattail and watercress on wetter surfaces and Nebraska sedge or redosier dogwood on drier. Management information applicable

to this type is summarized in Hansen et al. (1995 page 401) as the beaked sedge community and in Crowe and Clausnitzer (1997 page 178).

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	0	0	0
Herbaceous	4.5	2.5	7

COMMON SPECIES	n=3 cover			
	constancy	average	min	max
Trees	0%			
Shrubs	0%			
Graminoids	100%	101	62	140
<i>Carex utriculata</i>	100%	57	30	90
<i>Phalaris arundinacea</i>	100%	15	1	30
<i>Schoenoplectus acutus</i>	67%	16	3	30
<i>Glyceria striata</i>	67%	13	1	30
<i>Carex stipata</i>	33%	13	13	13
<i>Juncus balticus</i>	33%	3	3	3
<i>Eleocharis palustris</i>	33%	3	3	3
Forbs	100%	89	49	150
<i>Typha latifolia</i>	100%	13	1	30
<i>Rorippa nasturtium-aquaticum</i>	67%	24	8	40
<i>Mimulus guttatus</i>	67%	22	13	30
<i>Anthriscus scandicina</i>	67%	11	8	13
<i>Polygonum hydropiperoides</i>	67%	8	3	13
<i>Sparganium eurycarpum</i>	67%	2	1	3
<i>Epilobium ciliatum</i> ssp. <i>watsonii</i>	67%	2	1	3

Classification. Crowe and Clausnitzer (1997) and Kovalchik (1992) described this association with the common name bladder sedge. Prior to the early 1990's, the name beaked sedge (*Carex rostrata*) was misspelled to Northwest Territory sedge (*Carex utriculata*). The former name was used to describe a common wetland community type in the western United States. For example, Kovalchik (1987) and Hansen et al. (1995) described this association as a beaked sedge association.

Common spikerush association
***Eleocharis palustris* association**
 NVC code: CEG L0001833

Plots 98RC012, 98RC122, 98RC171, 98RC181, 99RC121

Location. This herbaceous community is found throughout the arid western U.S. It has been described across Washington and has been observed in all the dryland counties in eastern Washington. Samples are from Adams and Lincoln County.

STREAM CHARACTERISTICS	average	Min	max
width:depth ratio	28.1	6.8	50
width of floodplain (ft)	207.6	28	500
entrenchment ratio	5	1.5	10
stream gradient (%)	0.9	0.5	1
Rosgen types	3 C3, E1, E5		

Fluvial setting. This community occurs along river and lake shorelines that are prone to yearly flooding and on soils that often stay wet throughout the growing season. It was sampled in a variety of valleys; all with low stream gradients. It was observed along pond margins and in the bottom some vernal ponds. This community was sampled on muddy point bars and on streambanks near or below bankfull. Streams are regulated and unregulated, and intermittent and perennial. Bareground or litter dominates the soil surface although it is often submerged by water. Soils typically have high organic content in surface layers and are associated with coarse-textured mineral soil although one sample was basalt rubble mixed with volcanic ash on a shoreline. Mottling and/or gleying layers were detected at 1 and 13 inches at two sites and undetected in the top 18 inches of soil at two other sites. See representative stream profiles L1 and L2 page 51.

FLUVIAL SURFACE	average	Min	max
flooding potential index (FPI)	-0.1	-0.4	0.2
percent slope	0.7	0.0	1.0
position	channel shelf, 3 gravelbar, streambank		

PERCENT OF GROUND COVER	average	Min	max
litter	34	0	90
moss	8	0	30
bareground	30	3	75
gravel	0	0	2
cobble-boulder	1	0	3
bedrock	0	0	0
water	27	0	80

SOIL SURFACE HORIZON	average	Min	max
percent of coarse fragments (n=5)	16	0	80
texture	gravel, sand, sandy loam, silt, clay loam		

Vegetation. This is a dense to open herbaceous community that is typically less than a foot tall. Common spikerush, an aggressive rhizomatous species, is always present and abundant with 50-90% cover. Baltic rush appeared abundantly in one plot. Willow dock, seep monkeyflower, water speedwell, and arumleaf arrowhead occurred in most plots. Watercress can be abundant.

This type appeared between the channel and Baltic rush, bentgrass and quackgrass communities. Management information applicable to this type is summarized in Hansen et al. (1995 page 433) and Crowe and Clausnitzer (1997 page 182).

LAYER HEIGHT (ft)	average	min	max
Trees	10	0	50
Shrubs	0	0	0
Herbaceous	1.5	1	3

COMMON SPECIES	n=3 cover			
	constancy	average	min	max
Shrubs	0%			
Graminoids	100%	98	83	140
<i>Eleocharis palustris</i>	100%	72	20	98
<i>Juncus balticus</i>	60%	26	8	50
<i>Agrostis stolonifera</i>	40%	6	3	8
<i>Phalaris arundinacea</i>	40%	3	3	3
Forbs	100%	36	5	100
<i>Rumex salicifolius</i>	80%	12	1	30
<i>Sagittaria cuneata</i>	80%	3	1	5
<i>Mimulus guttatus</i>	60%	5	1	13
<i>Veronica anagallis-aquatica</i>	60%	5	3	10
<i>Rorippa nasturtium-aquaticum</i>	40%	30	10	50
<i>Marsilea vestita</i>	20%	13	13	13
Mosses	20%	1	1	1

Classification. This type is similar to the common spikerush community that occurs in western United States (Crowe & Clausnitzer 1997, Kovalchik 1987, 1992, Hansen et al. 1995, Manning and Padgett 1989, and other citations).

Woolly sedge – common spikerush association
Carex lanuginosa* (*C. pellita*) – *Eleocharis palustris
association

NVC code: CEGL0001809

Plots 99RC061, 99RC062, 99RC113, 99RC131, 99CB303, 00RC213, 00RC61, 00RC131

Location. This sedge-dominated community is similar to a widespread type that is recognized throughout the interior Pacific Northwest. In Washington's Columbia Basin, it has been sampled in Adams, Douglas, Grant, Garfield, and Lincoln counties and is likely in other dryland counties in Washington with streams and ponds.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	14.6	5.0	29
width of floodplain (ft)	30	13	50
entrenchment ratio	1.8	1.2	2.6
stream gradient (%)	1.1	0.5	3
Rosgen types	2 B1, C5, E4, E6, F3b, F4, spring		

Fluvial setting. In Oregon, similar communities appear in wet basins, springs and floodplains along Rosgen C and E stream types. These sites flood during spring runoff and dry to 8 to 24 inches by midsummer. Soils are organic matter-rich, fine-textured and have a high water holding capacity. In Washington's Columbia Basin, this type was sampled in valleys with less than 3% gradient. This community occurred at a spring, on perennial streams, and on intermittent streams apparently with spring-fed reaches. Sites are near bankfull and appear to flood annually. All sites had dark, fine textured, often mucky surface soil layer. Mottling and/or gleying layers were detected at 3, 4 and 10 inches at three sites and undetected in the top 10 inches of soil at two other sites. See representative stream profiles L3 and L4 page 51.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.1	-0.1	0.4
percent slope	1.6	0	7
Position	3 channel shelves, 3 abandon channels, gravelbar, floodplain		

PERCENT OF GROUND COVER			
litter	62	0	97
moss	3	0	10
bareground	32	0	80
gravel	1	0	5
cobble-boulder	0	0	1
bedrock	0	0	0
water	3	0	14

SOIL SURFACE HORIZON			
percent of coarse fragments (n=8)	15	0	60
texture	hemic, fibric, fine sandy loam, 2 silt loam, silty clay loam		

Vegetation. This dense sedge and grass community is 2-3 feet tall. It can have scattered flood tolerant shrubs or tree species. Woolly sedge dominates with more than 25% cover on the least disturbed stands coverage and can exceed 80% cover. Reed canarygrass, Kentucky

bluegrass and Baltic rush are common to abundant on more disturbed sites. Reed canarygrass can be more abundant than woolly sedge particularly if it overtops woolly sedge late in the growing season. Common spikerush is found in most plots. Forb diversity provides 40% average cover. Willowherb, seep monkeyflower, common horsetail and Canada goldenrod are frequent occurring forb species. Management information applicable to this type is summarized in Hansen et al. (1995 page 392) as the slender sedge community and in Kovalchik (1987 page 98).

LAYER HEIGHT (ft)	average	min	max
Trees	1	0	8
Shrubs	1	0	4
Herbaceous	2.1	1	3

COMMON SPECIES	n=8 cover			
	constancy	average	min	max
Trees	13%	13	13	13
Elaeagnus angustifolia	13%	13	13	13
Shrubs	25%	2	1	3
Salix exigua	25%	2	1	3
Graminoids	100%	103	81	144
Carex lanuginosa	100%	51	1	90
Juncus balticus	88%	30	3	80
Eleocharis palustris	88%	13	1	60
Phalaris arundinacea	50%	16	10	20
Agrostis stolonifera	38%	2	1	3
Schoenoplectus americanus	25%	7	1	13
Hordeum jubatum	0%			
Carex nebrascensis	0%			
Schoenoplectus acutus	0%			
Forbs	100%	41	5	115
Epilobium ciliatum ssp. watsonii	63%	1	1	1
Physostegia parviflora	50%	5	1	13
Equisetum arvense	50%	25	1	60
Solidago canadensis	50%	4	1	13
Cirsium arvense	38%	1	1	1
Mimulus guttatus	38%	1	1	1
Lemna minor	25%	30	30	30
Berula erecta	25%	16	1	30
Typha latifolia	25%	3	3	3
Chenopodium album	25%	2	1	3
Euthamia occidentalis	13%	13	13	13
Cicuta douglasii	13%	8	8	8
Veronica anagallis-aquatica	13%	3	3	3
Rorippa nasturtium-aquaticum	13%	3	3	3
Argentina anserina	0%			

Classification. This type is similar to an association described by Kovalchik (1987) and Hansen et al. (1995). The USDA Plants Database lists woolly sedge as *Carex pellita* that is a synonym of the more generally used name *C. lanuginosa*. Currently this community is included in the general woolly sedge association.

Woolly sedge – silverweed cinquefoil association
Carex lanuginosa* (*C. pellita*) - *Argentina anserina
association

NVC code: CEG001809

Plots 98RC043, 98RC053, 98RC073, 99RC122, 00RC122

Location. This sedge-dominated community is similar to a widespread type found throughout the interior Pacific Northwest. It is sampled in Adams, Lincoln and Douglas counties and is likely in the other dryland counties in Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	33.3	3	93.8
width of floodplain (ft)	250.1	28	605
entrenchment ratio	4.9	2	11
stream gradient (%)	1.7	1	5
Rosgen types	C1, E5, E6, F1		

Fluvial setting. In Washington's Columbia Basin, this community was sampled in valleys with less than 3% gradient and near perennial streams or intermittent streams with spring-fed reaches. Sites are well within the floodprone zone and appear to flood annually. Mottling and/or gleying layers appeared at 9, 10 and 11 inches below the surface at all three sites sampled. See representative stream profile L2 page 51.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.2	0	0.5
percent slope	3.25	0	10
position	channel shelf, 3 floodplains		

PERCENT OF GROUND COVER	average	min	max
litter	68	30	100
moss	0	0	1
bareground	33	0	70
gravel	0	0	0
cobble-boulder	0	0	0
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	0	0	0
texture	hemic, sandy loam, silt, clay loam		

Vegetation. This is a dense herbaceous community dominated by a rhizomatous sedge species. Woolly sedge usually is the dominant sedge. Nebraska sedge rarely appears in this community but with much less cover than woolly sedge. Baltic rush and Canada thistle are common to abundant on more disturbed sites. Reed canarygrass appears in this type but is more abundant in the Nebraska sedge - silverweed cinquefoil community. Forb diversity is low and provides 40% average cover. Water knotweed and/or swamp smartweed are frequent members of this community. Management information applicable to this type is summarized in Hansen et al. (1995 page 398) and in Crowe and Clausnitzer (1997 page 192).

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	0	0	0
Herbaceous	2.5	2	3

Trees	0	0	0
Shrubs	0	0	0
Herbaceous	2.5	2	3

COMMON SPECIES	n=5 constancy	cover average	min	max
Trees	0%			
Shrubs	0%			
Graminoids	100%	122	107	147
<i>Carex lanuginosa</i>	100%	73	60	80
<i>Juncus balticus</i>	100%	43	30	60
<i>Carex nebrascensis</i>	25%	3	3	3
<i>Phalaris arundinacea</i>	25%	3	3	3
<i>Schoenoplectus americanus</i>	50%	2	1	3
<i>Eleocharis palustris</i>	50%	2	1	3
<i>Hordeum jubatum</i>	50%	2	1	3
<i>Agrostis stolonifera</i>	25%	3	3	3
<i>Calamagrostis canadensis</i>	25%	3	3	3
<i>Schoenoplectus acutus</i>	25%	1	1	1
<i>Juncus longistylis</i>	25%	1	1	1
<i>Polypogon monspeliensis</i>	0%			
<i>Glyceria striata</i>	0%			
Forbs	100%	39	13	65
<i>Argentina anserina</i>	100%	4	3	8
<i>Cirsium arvense</i>	75%	18	1	40
<i>Polygonum amphibium</i>	50%	6	3	8
<i>Polygonum hydropiperoides</i>	50%	19	8	30
<i>Veronica anagallis-aquatica</i>	25%	3	3	3
<i>Physostegia parviflora</i>	25%	3	3	3
<i>Euthamia occidentalis</i>	25%	3	3	3
<i>Mentha arvensis</i>	25%	1	1	1
<i>Epilobium ciliatum</i> ssp. <i>watsonii</i>	0%			
<i>Mimulus guttatus</i>	0%			
<i>Equisetum arvense</i>	0%			
<i>Rorippa nasturtium-aquaticum</i>	0%			

Classification. The USDA Plants Database lists woolly sedge as *Carex pellita*, a name which is a synonym of the more generally applied name *C. lanuginosa*. Although described here as a separate entity, this community type is similar to an association described by Kovalchik (1987), Crowe and Clausnitzer (1997) and Hansen et al. (1995). It is included in the general woolly sedge association. For this report, this community type is distinguished from the woolly sedge – common spikerush community by the presence of silverweed cinquefoil and poor occurrence of species usually associated with flowing water such as, watercress, water speedwell, and monkeyflower. Reed canarygrass is less abundant here than in the Nebraska sedge – common spikerush community.

Nebraska sedge - silverweed cinquefoil community
***Carex nebrascensis* - *Argentina anserina* community**
 NVC code: CEG0001813

Plots 99RC114, 99RC123, 99RC181, 00RC101, 00RC123

Location. This sedge-dominated community is similar to a widespread type found throughout the interior Pacific Northwest. It is sampled in Lincoln and Douglas counties and likely in the other dryland counties in Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	7.1	2.5	12
width of floodplain (ft)	32.2	27	41
entrenchment ratio	5.5	2.3	11
stream gradient (%)	0.8	0.5	1
Rosgen types	2 springs, C5, E5, E6		

Fluvial setting. This community was sampled in valleys with less than 3% gradient. It occurred near springs and on perennial and intermittent streams with spring-fed reaches. Sites are usually well within the floodprone zone. Streamside sites flood annually and appear to dry during the growing season to a shallow water table by late summer. The spring locations have dark, organic soils. The streamside sites had fine sandy loams or clay surface soil. Mottling and/or gleying layers appeared at 6, 6, 17, and 21 inches below the surface at four of five sites sampled. Water was encountered at 9 inches at the fifth sample site. See representative stream profile L3 page 51.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.4	0.2	0.7
percent slope	3.9	0.5	15
position	spring, channel shelf, 2 floodplains, first terrace		

PERCENT OF GROUND COVER

litter	71	40	95
moss	0	0	0
bareground	27	0	60
gravel	0	0	0
cobble-boulder	0	0	0
bedrock	0	0	0
water	2	0	10

SOIL SURFACE HORIZON

percent of coarse fragments (n=4)	0	0	0
texture	fibric, hemic, 2 sandy loam, clay loam		

Vegetation. This is a dense to open herbaceous community dominated by an aggressive rhizomatous species. The typical dominant, Nebraska sedge, is tolerant of trampling and increases relative to other sedges where grazed. Baltic rush is always present and can be abundant. Woolly sedge can appear in this community but with less cover than Nebraska sedge. Reed canarygrass, Baltic rush, and Kentucky bluegrass are common to abundant on more disturbed sites. Reed canarygrass can be more abundant than Nebraska sedge after it is overtopped late in the growing season. Forb

diversity is low and they provide 50% average cover. Water speedwell, willowherb, seep monkeyflower, watercress, common horsetail and western goldenrod are common forb species. Management information applicable to this type is summarized in Hansen et al. (1995 page 398 and in Crowe and Clausnitzer (1997 page 192).

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	0	0	0
Herbaceous	2.6	2	3

COMMON SPECIES	n=5 constancy	cover average	min	max
Trees	0%			
Shrubs	0%			
Graminoids	100%	118	106	139
<i>Carex nebrascensis</i>	100%	70	50	98
<i>Juncus balticus</i>	100%	24	8	50
<i>Carex lanuginosa</i>	60%	17	1	30
<i>Eleocharis palustris</i>	60%	5	1	13
<i>Phalaris arundinacea</i>	40%	11	8	13
<i>Schoenoplectus americanus</i>	20%	13	13	13
<i>Polypogon monspeliensis</i>	20%	8	8	8
<i>Glyceria striata</i>	20%	8	8	8
<i>Juncus bufonius</i>	20%	3	3	3
<i>Poa pratensis</i>	20%	1	1	1
Forbs	100%	50	28	77
<i>Argentina anserina</i>	80%	9	1	30
<i>Cirsium arvense</i>	60%	14	1	20
<i>Veronica anagallis-aquatica</i>	60%	6	1	13
<i>Epilobium ciliatum</i> ssp. <i>watsonii</i>	60%	3	1	8
<i>Physostegia parviflora</i>	40%	6	3	8
<i>Euthamia occidentalis</i>	40%	6	3	8
<i>Mimulus guttatus</i>	40%	3	3	3
<i>Mentha arvensis</i>	40%	3	3	3
<i>Equisetum arvense</i>	40%	3	3	3
<i>Rorippa nasturtium-aquaticum</i>	40%	2	1	3
<i>Rumex salicifolius</i>	40%	1	1	1

Classification. This type is similar to an association described by Kovalchik (1987), Crowe and Clausnitzer (1997) and Hansen et al. (1995). Plot 99RC071, co-dominated by Nebraska sedge and reed canarygrass, is similar to the community described here but lacks silverweed cinquefoil, and woolly sedge. It is included in the general Nebraska sedge association.

Baltic rush - silverweed cinquefoil community
***Juncus balticus* - *Argentina anserina* community**
 NVC code: CEGL0001838

Plots 98RC032, 98RC054, 98RC172, 00RC102, 00RC212

Location. This herbaceous community likely is found throughout the western U.S. Washington samples are from Adams, Douglas and Grant County. Although it has been observed it is not sampled in Lincoln and Whitman counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	68	8.3	120
width of floodplain (ft)	901.7	500	1600
entrenchment ratio	2.1	1.3	3.3
Stream gradient (%)	0.6	0.5	1
Rosgen types	E1, 2 F1, E6, Spring		

Fluvial setting. This community is associated with sites along rivers and lakes that flood annually and with soils that are wet to moist through much of the growing season. It was sampled in broad canyons with low stream gradients. It appears low in the floodprone zone. This community has also been observed in vernal ponds. Soils typically have high organic matter content in surface layers and fine-textured mineral soil. Mottling and/or gleying layers appeared at 7 inches below the surface at one site but were undetected with the top 18 inches at two other sample sites. See representative stream profile L1 page 51.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.1	-0.1	0.2
percent slope	4.4	0	20
position	3 floodplains, 2 streambanks		

PERCENT OF GROUND COVER	average	min	max
litter	81	15	100
moss	0	0	0
bareground	18	0	80
gravel	0	0	0
cobble-boulder	0	0	0
bedrock	0	0	0
water	1	0	5

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	0	0	0
texture	fibric, sandy loam, silt loam, silt, silty clay loam		

Vegetation. This is a dense herbaceous community dominated by an aggressive rhizomatous species. Baltic rush is always present and usually abundant (50-100% cover). Clustered field sedge appears in many samples and represents the drier variant of this type. Silverweed

cinquefoil is the most abundant forb in this community although Rocky Mountain iris may be the most obvious particular late in the growing season. Wild barley and rabbitfoot are frequent members of this community. This type appears between the channel, common spikerush, or woolly sedge communities and saltgrass - clustered field sedge communities including those with intermediate wheatgrass. Management information applicable to this type is summarized in Hansen et al. (1995 page 445) and Crowe and Clausnitzer (1997 page 194). Both authors consider this a grazing disclimax community.

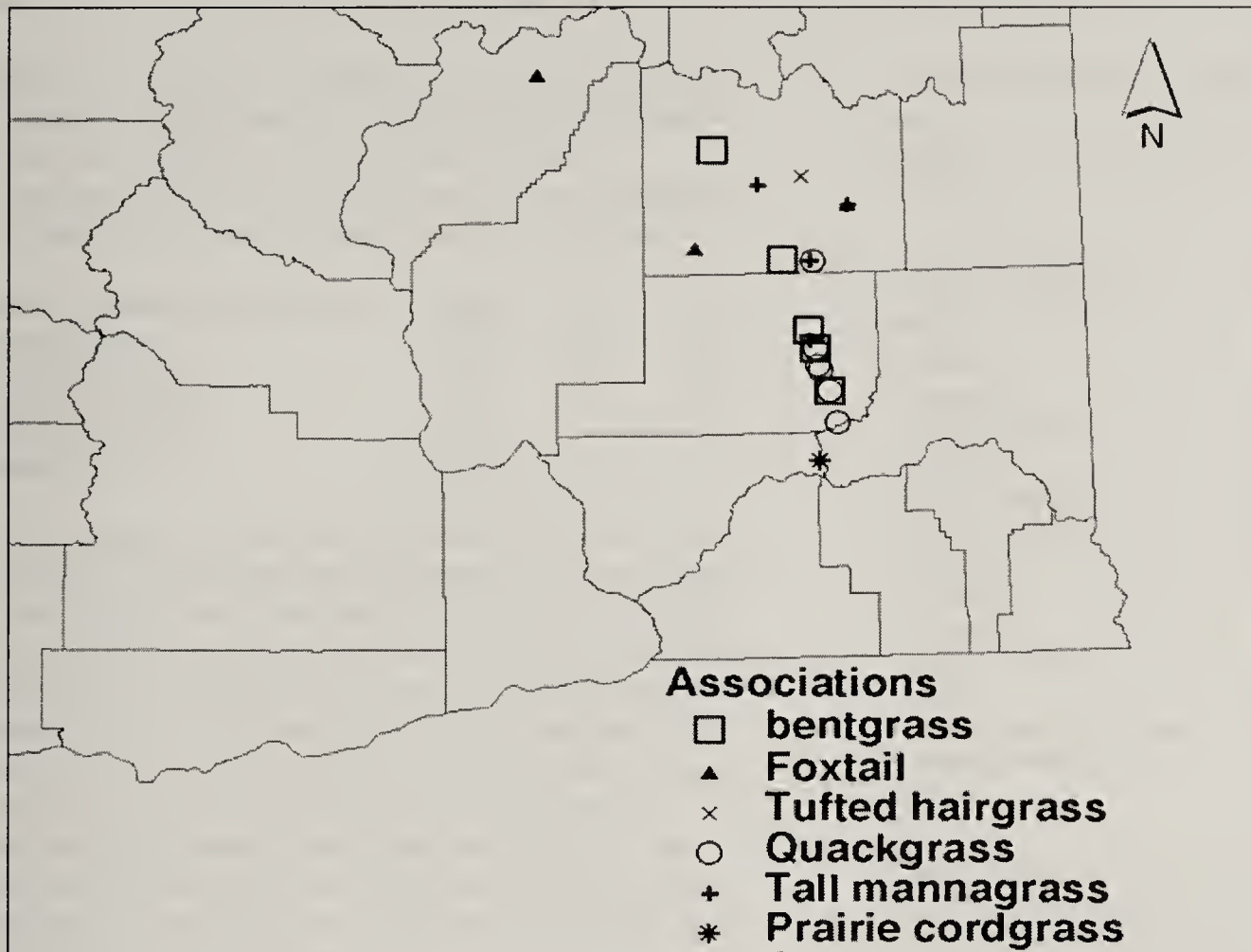
LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	0	0	0
Herbaceous	2.9	2	3.5

COMMON SPECIES	n=5 constancy	cover average	min	max
Trees	0%			
Shrubs	0%			
Graminoids	100%	104	99	112
<i>Juncus balticus</i>	100%	85	50	100
<i>Carex praegracilis</i>	40%	37	13	60
<i>Hordeum jubatum</i>	40%	3	3	3
<i>Polypogon monspeliensis</i>	40%	2	1	3
<i>Hordeum brachyantherum</i>	40%	1	1	1
<i>Juncus ensifolius</i>	20%	3	3	3
<i>Juncus acuminatus</i>	20%	3	3	3
<i>Schoenoplectus americanus</i>	20%	1	1	1
<i>Agrostis stolonifera</i>	20%	1	1	1
<i>Agrostis interrupta</i>	20%	1	1	1
<i>Carex nebrascensis</i>	0%			
<i>Carex lanuginosa</i>	0%			
Forbs	100%	43	4	73
<i>Argentina anserina</i>	100%	30	3	60
<i>Iris missouriensis</i>	60%	7	1	13
<i>Cirsium arvense</i>	20%	13	13	13
<i>Mentha arvensis</i>	20%	13	13	13
<i>Veronica anagallis-aquatica</i>	20%	8	8	8
<i>Triglochin maritimum</i>	20%	3	3	3
<i>Epilobium ciliatum</i> ssp. <i>watsonii</i>	0%			

Classification. This type is similar to the Baltic rush community that occurs across the western US. This community is a "converted" community from continued overgrazing in wet meadow environments (Montana technical guide to rangelands 1997). It is distinguished here as a seral or retrogressed form of the woolly sedge or the Nebraska sedge association.

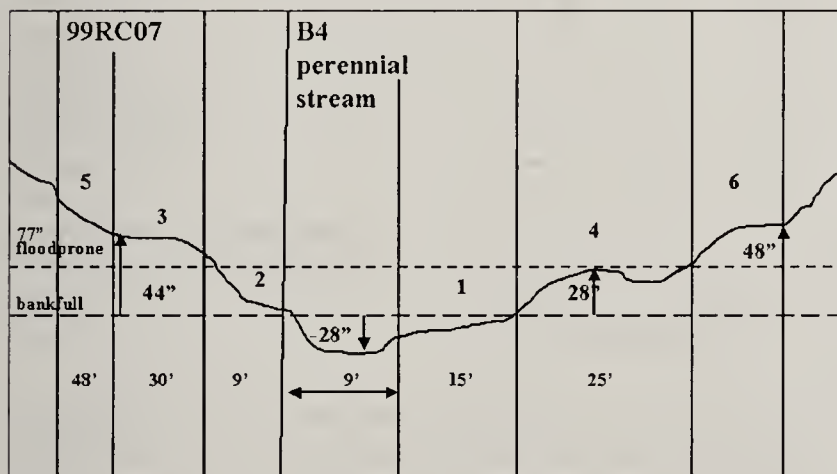
Grass Meadow and Riparian Vegetation Types

Plot locations



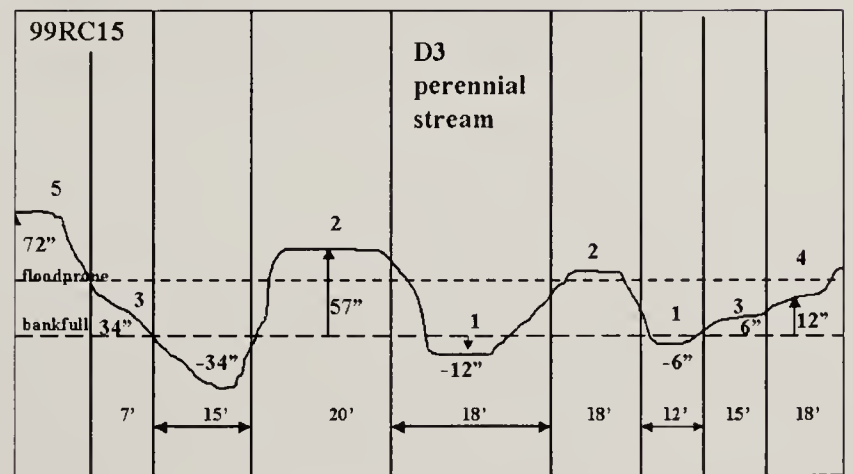
Selected stream profiles

G1



Stream and riparian vegetation profile at Wilson Creek, Lincoln County. 1= Nebraska sedge, 2= reed canarygrass, 3= thinlineaf alder / redosier dogwood, and 4= whitetop, and 5= stinging nettle.

G2



Stream and riparian vegetation profile at upper Crab Creek, Lincoln County. 1= reed canarygrass, 2= black hawthorn / Wood's rose, 3= quackgrass, 4= white sagebrush, and 5= basin wildrye - cheatgrass.

Tall mannagrass association
***Glyceria elata* association**

NVC code: none

Plots 99RC143, 99RC182, 99RC223, 99RC224, 98RC152

Location. This grass-dominated community is similar to a widespread type found throughout the interior Pacific Northwest. Samples on the Columbia Basin in Washington are in Adams and Lincoln County, although it is likely in the other dryland counties of the state.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	75.9	9.4	250
width of floodplain (ft)	40.8	25	58
entrenchment ratio	2.1	1	3.6
stream gradient (%)	0.8	0	1.5
Rosgen types	3 C4, spring		

Fluvial setting. In the Blue Mountains, this association appears on floodplains along Rosgen B2, B3, B4, and C4 stream types. These sites flood during spring runoff and dry to 12 to 20 inches by midsummer. Soils are shallow with high coarse fragment content. In the Columbia Basin, this type was sampled in 100 to 1000-foot wide valleys with 1 to 5% gradient. This community occurred at a spring and on a perennial stream. Sites are near bankfull along streams that floods annually. All sites had a well developed humic layer that was 20 inches thick at one spring location. The stream reach site had a restrictive layer at 13 inches.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.9	0	7.5
percent slope	1.7	0	5
position	2 springs, 2 channel shelves		

PERCENT OF GROUND COVER

	average	min	max
litter	69	40	98
moss	4	0	10
bareground	17	0	40
gravel	0	0	0
cobble-boulder	0	0	0
bedrock	0	0	0
water	10	0	50

SOIL SURFACE HORIZON

percent of coarse fragments (n=5)	0	0	1
texture	sapric, hemic, fine sandy loam, sandy clay loam		

Vegetation. This dense grass community with sedges and rushes is 3 to 4 feet tall. Tall mannagrass dominates the community with 13-60% cover. Creeping bentgrass was codominant or dominant in all plots. On more disturbed sites, tall mannagrass can be subordinate to Baltic rush or reed canarygrass, the latter can be very abundant late in the growing season. Nebraska sedge appears in this community with less cover than tall mannagrass. Water speedwell and seep monkeyflower are common forbs in this community. Overall forb

diversity is low and typically provides three times less average cover to total vegetation cover than do grasses, sedges, and rushes. Management information applicable to this type is summarized in Crowe and Clausnitzer (1997page 209).

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	2	0	7
Herbaceous	3	1	6

COMMON SPECIES	n=5 cover			
	constancy	average	min	max
Shrubs	20%	1	1	1
Rosa woodsii	20%	1	1	1
Graminoids	100%	145	63	198
Agrostis stolonifera	100%	41	3	80
Glyceria elata	100%	26	3	60
Carex nebrascensis	80%	31	3	70
Phalaris arundinacea	80%	24	3	50
Juncus balticus	60%	35	3	90
Poa pratensis	60%	2	1	3
Poa palustris	40%	11	1	20
Carex lanuginosa	40%	8	3	13
Forbs	100%	41	16	67
Veronica anagallis-aquatica	60%	8	1	20
Mimulus guttatus	60%	6	1	13
Mosses	40%	8	8	8

Classification. This type is similar to an association described by Kovalchik (1992; 2 plots) and Crowe and Clausnitzer (1997; 10 plots) at higher elevations. This community is distinguished by an abundance of tall mannagrass that is usually associated with water speedwell, and by little and no cover of Nebraska sedge. Although a distinct community, many of these stands are likely transition to associations with a woody layer. In the upper Crab Creek watershed, thinleaf alder or water birch are likely companion woody species. This community is yet to be included in the NVC.

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Reed canarygrass association
***Phalaris arundinacea* association**
 NVC code: CEG0001474

Plots 98RC062, 98RC072, 98RC082, 98RC104, 98RC113, 98RC145, 98RC162, 98RC191, 98RC221, 98RC232, 98RC0241, 99RC41, 99RC061, 99RC072, 99RC101, 99RC111, 99RC161, 99RC171, 99RC191, 99RC222, 99CB301, 99CB1100, 99CB1101, 99CB1504, 99CB1901, 00RC041, 00RC052, 00RC171, 00RC230

Location. This herbaceous community occurs throughout the western United States and across Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	21.1	4.0	60
width of floodplain (ft)	157.7	5.8	1500
entrenchment ratio	6.6	1.2	53.6
stream gradient (%)	1.2	0	3
Rosgen types	B1c, B2, 5-B3, B6c, 4-C3, C4, C5, C6, D1, 2-E4, 2-E5		

Fluvial setting. This community is associated with stream terraces sampled in a wide range of valleys typically those less than 3% gradient. This community occurs mostly on channel shelves but also occupies first terraces and point bars. It usually appears near bankfull. Most samples were associated with Rosgen stream type B3, C3 and E4 and E5. Streams are regulated and unregulated perennial and slightly to moderately entrenched. Sites are generally flat or undulating and always with high litter cover. Soils are fine-textured although sandy or gravel soils have been sampled. The upper soil layers are often deposited or captured sediments from the current year's flood although organic layers were frequently sampled. Mottling or gleying was detected at 1, 6, 10, 20 and 30 inches. They were undetected in the top 10 inches of five samples. See representative stream profiles T1, T3 page 22, S2, S6 page 31, L4 page 51, G1, and G2 page 59.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.12	-0.6	0.8
percent slope	7.5	0	58
position	aquatic bed, 18 channel shelves, 7 floodplains, gravelbar, streambank, 2 springs		

PERCENT OF GROUND COVER			
litter	75	5	100
moss	0	0	5
bareground	11	0	80
gravel	8	0	79
cobble-boulder	2	0	20
bedrock	0	0	0
water	4	0	50

SOIL SURFACE HORIZON			
percent of coarse fragments (n=18)	11	0	70
texture	2 cobble, 2 gravel, sand, 2 sandy loam, 3 silt loam, silt, 3 sandy clay loam, 6 silty clay loam, hemic		

Vegetation. This is a dense grassland community

dominated by a 4 to 6-foot tall rhizomatous grass. Reed canarygrass is always present and dominates stands with over 50% of total cover; it can be the only species with 100% cover. It is also the most frequently encountered species in all sampling and can be a late season dominant in all herbaceous community types that occur within the floodprone zone (FPI < 1). Kentucky bluegrass is a commonly encountered grass. Canadian thistle, Canada goldenrod, and stinging nettle are the most common forbs in this community. Other species that may indicate site differences within the reed canarygrass type are: 1) western goldentop on higher, old gravel or point bars, 2) swamp smartweed on more saturated substrates, and 3) quackgrass on deep fine-textured soils. This type appears adjacent to the active channel, bulrush, Northwest Territory sedge or woolly sedge communities and clustered field sedge pastures with intermediate wheatgrass or basin wildrye, black hawthorn, redosier dogwood or uplands in narrow canyons. Management information for this type is summarized in Hansen et al. (1995 page 447).

LAYER HEIGHT (ft)	average	min	max
Trees	4	0	75
Shrubs	0	0	6
Herbaceous	5	1	8

	n=31 constancy	average	cover min	max
Trees	6%	1	1	1
Pinus ponderosa	3%	1	1	1
Populus tremuloides	3%	1	1	1
Shrubs	16%	2	1	4
Salix exigua	10%	2	1	3
Rosa woodsii	6%	1	1	1
Graminoids	100%	98	12	183
Phalaris arundinacea	100%	83	10	100
Poa pratensis	29%	7	1	30
Eleocharis palustris	23%	3	1	8
Forbs	100%	13	0	73
Cirsium arvense	35%	4	1	8
Solidago canadensis	23%	3	1	8
Euthamia occidentalis	19%	14	1	30
Mosses	6%	6	1	10

Classification. This type is similar to the reed canarygrass community that occurs across the western US. Currently, native communities of reed canarygrass are not distinguished from introduced populations. That distinction may not be feasible.

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Water foxtail community

***Alopecurus geniculatus* community**

NVC code: none

Plots 99RC050, 99RC221, 00RC121

Location. This is an undescribed type. Water foxtail is an introduced grass sampled in Lincoln and Douglas counties. It likely occurs elsewhere in Washington.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	12.3	2.5	22
width of floodplain (ft)	33.8	27.5	40
entrenchment ratio	6.4	1.8	11
stream gradient (%)	1.3	1	2
Rosgen types	C4, E4b, E6		

Fluvial setting. This type is associated with streams near pastures or agricultural lands. It was sampled in 30 to 300-foot wide valleys with 2% gradients. Streams were perennial and intermittent. This community occurred near bankfull on point bars or stream channel sides often submerged early in the growing season. The thin surface soil layers were fine sandy loam and gravel. One site was a gravel bar with 3 inches of gravel over a humic layer. A mottled soil layer appeared 3 inches below the surface on another site. See representative stream profile S3 page 31.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0	-0.2	0.2
percent slope	4	3	5
Position	2 channel shelves, gravelbar		

PERCENT OF GROUND COVER

Litter	67	10	100
moss	0	0	0
bareground	0.5	0	1
gravel	2.5	0	5
cobble-boulder	0	0	0
bedrock	0	0	5
water	18	0	80

SOIL SURFACE HORIZON

percent of coarse fragments (n=2)	25	0	50
texture	sandy clay loam, fine sandy loam		

Vegetation. This is a closed rhizomatous grass community less than one foot tall. Water foxtail dominates stands with bentgrass, common spikerush or reed canarygrass. The community has only a few scattered forbs, such as water speedwell, black medick, and alkali buttercup. Sample stands had 9 and 10 species per plot. Sites were heavily grazed. This type appeared adjacent to the channel and a Nebraska sedge - reed canarygrass community.

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	0	0	0
Herbaceous	1.2	0.3	2

COMMON SPECIES	n=3 value			
	constancy	average	min	max
Shrubs	0%			
Graminoids	100%	98	28	141
<i>Alopecurus geniculatus</i>	100%	36	8	80
<i>Eleocharis palustris</i>	67%	35	20	50
<i>Agrostis stolonifera</i>	67%	30	30	30
<i>Phalaris arundinacea</i>	67%	8	8	8
<i>Polygonum monspeliensis</i>	33%	20	20	20
<i>Glyceria striata</i>	33%	13	13	13
<i>Carex lanuginosa</i>	33%	1	1	1
Forbs	67%	37	6	96
<i>Medicago lupulina</i>	67%	2	1	3
<i>Veronica anagallis-aquatica</i>	67%	2	1	3
<i>Ranunculus cymbalaria</i>	67%	1	1	1
<i>Polygonum amphibium</i>	33%	30	30	30
<i>Rorippa nasturtium-aquaticum</i>	33%	20	20	20
<i>Cirsium arvense</i>	33%	13	13	13
<i>Epilobium ciliatum</i> ssp. <i>glandulosum</i>	33%	8	8	8
<i>Mimulus guttatus</i>	33%	8	8	8

Classification. It is closely related to the common spike rush association and probably represents a grazing disclimax of that community.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions. This is essential for ensuring the integrity of the financial statements and for providing a clear audit trail. The records should be kept up-to-date and should be easily accessible to all relevant parties.

2. The second part of the document outlines the procedures for the monthly financial review. This involves a thorough examination of the accounts and a comparison of the actual results with the budgeted figures. Any variances should be identified and explained, and appropriate corrective actions should be taken.

3. The third part of the document describes the process of preparing the quarterly financial statements. This includes the consolidation of the data from all departments and the preparation of the balance sheet, income statement, and cash flow statement. The statements should be reviewed and approved by the appropriate authority before being presented to the board of directors.

4. The fourth part of the document discusses the annual financial review. This is a comprehensive examination of the company's performance over the entire year. It involves a detailed analysis of the financial statements and a comparison of the actual results with the budgeted figures. The results of the review should be presented to the board of directors and used to inform the company's strategic planning for the following year.

Bentgrass community

Agrostis (stolonifera, capillaris) community

NVC code: none

Plots 98RC093, 98RC123, 98RC182, 99RC172, 99RC200, 99RC201

Location. This community was sampled in Lincoln and Adams counties and been observed across the Columbia Basin. Similar communities are found, but undescribed, throughout the western United States.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	20	12	41
width of floodplain (ft)	157	18	600
entrenchment ratio	10	1.5	42.8
stream gradient (%)	1	0.5	1
Rosgen types	2 C3, 3 C6, G4		

Fluvial setting. In eastern Washington, the bentgrass community occurs in narrow to wide valleys. It was sampled on channel shelves and gravel bars that appear to be frequently disturbed by flooding or by livestock. It is found near bankfull on an ephemeral stream, within the floodprone zone on perennial streams, and near a spring stream. Exposed gravel or bareground are common features of the soil surface in this community. This is usually associated with a fine textured surface soil layer often over subsurface layers with a high percentage of coarse fragments. Both soil samples had a black, organic surface soil layer.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0	-0.5	0.9
percent slope	5	0	15
Position	2 channel shelves, floodplain, gravelbar, streambank, intermittent channel		

PERCENT OF GROUND COVER	average	min	max
Litter	46	5	80
moss	2	0	10
bareground	35	10	95
gravel	16	0	60
cobble-boulder	0	0	0
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0		
texture	cobble, silt loam, clay loam		

Vegetation. This rhizomatous grass community is up to three feet tall when not grazed and usually a closed grassland. Creeping bentgrass is always present and usually the dominant grass although quackgrass is often present and can be abundant. Colonial bentgrass also can be dominant. Most species in this community are exotic or native increasers with disturbance. Canadian thistle, Baltic rush, willow dock, common plantain and annual rabbit's-foot grass are found at most sites. White clover,

yellow sweet clover, black medic and cheatgrass are common invasive species. This type appeared adjacent to the channel and more moist woolly sedge - spikerush, common spike rush communities and higher surfaces with quackgrass, saltgrass or intermediate wheatgrass communities. Management information applicable to this type is summarized in Hansen et al. (1995 page 420).

LAYER HEIGHT (ft)	average	min	max
Trees	8	0	50
Shrubs	1	0	3
Herbaceous	3	0.2	8

COMMON SPECIES	n=6		cover	
	constancy	average	min	max
Understory trees	33%	2	1	3
Salix alba	17%	3	3	3
Betula occidentalis	17%	1	1	1
Shrubs	17%	3	3	3
Salix lutea	17%	3	3	3
Grasses	100%	77	26	139
Agrostis stolonifera	100%	32	8	80
Elytrigia repens var. repens	100%	15	3	30
Juncus balticus	67%	8	1	13
Phalaris arundinacea	50%	2	1	3
Poa pratensis	33%	8	3	13
Forbs	83%	66	9	155
Plantago major	67%	7	1	20
Rumex salicifolius	67%	5	1	13
Cirsium arvense	67%	3	1	3
Mosses	17%	3	3	3

Classification. This community occupies a similar fluvial environment as the native species dominated *Agrostis exarata-Agrostis scabra* Herbaceous Vegetation described in south central Idaho (CEGL001557) and as the Redtop community in Montana (Hansen et al.1995). The presence of bentgrass distinguishes this community from the typically less diverse, more cultivated quackgrass community.

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Quackgrass community

***Elytrigia repens* var. *repens* community**

NVC code: none

Plots 98RC014, 98RC074, 98RC083, 98RC183, 98RC105, 99RC153

Location. This grassland is sampled in Lincoln and Adams counties. This semicultivated/seminatural vegetation is found throughout the western United States.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	26	6	60
width of floodplain (ft)	295	50	1100
entrenchment ratio	11	1.25	45.8
stream gradient (%)	1	0.5	2
Rosgen types	3 C3, D3, F3b, E6		

Fluvial setting. This type is generally associated with streams near pastures or agricultural lands. It was sampled in 30 to over 1000-foot wide valleys with 1% or less gradients. This community occurred within the floodprone zone. The C3 stream types were inside deeply incised channels. Streams were perennial, both regulated and unregulated. Surfaces were steep to rolling and litter covered always with some exposed bareground. Soils are fine or coarse-textured soils and frequently contain coarse fragments. A mottled soil layer was detected at 60 inches in one sample and undetected in the top 12 inches in another. See representative stream profile G2 page 59.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1	0.2	2.5
percent slope	5	0	15
position	6 floodplains		

PERCENT OF GROUND COVER	average	min	max
litter	82	30	100
moss	0	0	0
bareground	12	0	40
gravel	5	0	25
cobble-boulder	0	0	0
bedrock	1	0	5
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0		
texture	cobble, sandy loam, silty clay loam		

Vegetation. This is a closed rhizomatous grass community that grows up to three tall when not grazed. Quackgrass completely dominates some stands with only a few scattered forbs or other grasses. Sample stands had 3 to 9 species per plot. Clustered field sedge was co-dominant in two stands and intermediate rye was co-dominant in two other stands. Canadian thistle, willow dock and Kentucky bluegrass are common species in this community. This type appeared adjacent to the more moist woolly sedge - spikerush and reed canarygrass communities and water birch or upland basin wildrye /

cheatgrass communities on higher surfaces.

Management information is not available for this type.

Pertinent management information on key species appears in Table 3.

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	1	0	4
Herbaceous	4	2	10

COMMON SPECIES	n=6	cover		
	constancy	average	min	max
Understory trees	0%			
Shrubs	17%	1	1	1
Artemisia ludoviciana	17%	1	1	1
Grasses	100%	108	76	153
Elytrigia repens var. repens	100%	58	20	98
Poa pratensis	50%	10	8	13
Elytrigia intermedia	33%	55	20	90
Carex praegracilis	33%	25	20	30
Phalaris arundinacea	33%	7	3	10
Bromus tectorum	17%	60	60	60
Hordeum murinum ssp. leporinum	17%	20	20	20
Eleocharis palustris	17%	8	8	8
Juncus balticus	17%	1	1	1
Agrostis stolonifera	0%			
Forbs	83%	40	12	112
Cirsium arvense	83%	7	1	13
Rumex salicifolius	50%	3	1	5
Polypogon monspeliensis	17%	3	3	3
Mosses	0%			

Classification. This type represents a grazing disclimax or semi-cultivated community. It differs from the bentgrass community by the high cover of quackgrass, the absence of bentgrass, and overall low species diversity.

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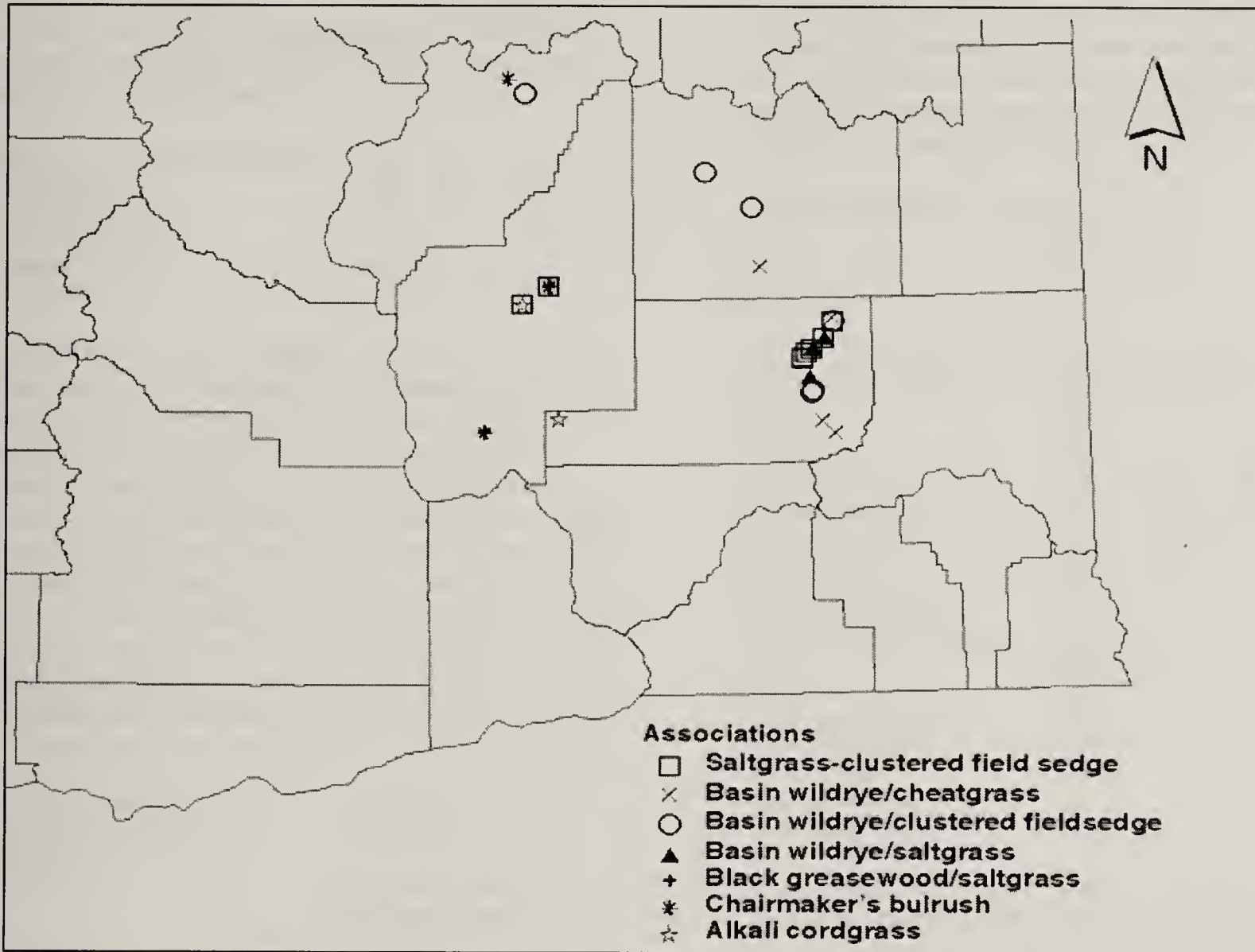
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Salt Meadow Riparian Vegetation Types

Plot locations





Saltgrass - Clustered field sedge community
***Distichlis spicata* - *Carex praeegracilis* community**
 NVC code: CEG001770

Plots 98RC033, 98RC055, 98RC115, 98RC124, 98RC173, 98RC253, 00RC214, 00RC222

Location. This grassland was sampled along Cow Creek in Adams County and Crab Creek in Grant County and has been observed in adjacent counties. As described here, this community may occur on appropriate sites across the Columbia Plateau.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	57.6	13.0	120
width of floodplain (ft)	491	56	1600
entrenchment ratio	1.9	1.3	3.3
stream gradient (%)	0.8	0.5	2
Rosgen types	2 C3, E1, 2 E6, 2 F1, F6		

Fluvial setting. This community is associated with stream terraces, vernal pools, and depressions with deep fine textured soils that stay moist into the growing season. It was sampled in broad canyons with low stream gradients although it appears in other settings. This community was sampled on stream terraces usually within the floodprone zone and in a vernal basin. All but one sample was associated with a regulated perennial stream. Sites are generally convex and appear to flood in high water years. Soils are fine-textured, well drained, and alkaline. Mottling was detected at 13 and 36 inches and undetected in the top 30 inches of soil at one site. See representative stream profile L1 page 51.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.6	-0.1	1.3
percent slope	1.2	0.0	5.0
position	channel shelf, floodplain, 4 first terraces, second terrace, basin		

PERCENT OF GROUND COVER			
litter	43	5	95
moss	7	0	40
bareground	51	5	95
gravel	0	0	0
cobble-boulder	0	0	1
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=5)	0	0	0
texture	4 silt loam, silty clay loam		

Vegetation. This is a dense grassland community less than a foot tall dominated by three rhizomatous grasses and one rhizomatous sedge species. Saltgrass is always present with 30-90% cover. It always occurs with clustered field sedge having 1-40% cover. Alkali bluegrass is usually present and often is as abundant as

saltgrass. Prairie cordgrass is usually present but rarely with high coverage. Baltic rush and alkali buttercup appear in half of the samples and represent a wetter variant of this type. Intermediate wheatgrass was planted at two sites. No other species was found in more than three of the six plots sampled. This type appeared adjacent to the less alkaline/saline, more moist communities Baltic rush, woolly sedge, and clustered field sedge pasture with intermediate wheatgrass. Basin wildrye, black hawthorn or greasewood community are also typical adjacent community types. Management information applicable to this type is summarized in Hansen et al. (1995 page 431).

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	0	0	0
Herbaceous	1.2	0.3	2

COMMON SPECIES	n=8 cover			
	constancy	average	min	max
Trees	0%			
Shrubs	0%			
Graminoids	100%	121	95	149
<i>Distichlis spicata</i>	100%	56	30	98
<i>Carex praeegracilis</i>	75%	18	1	40
<i>Poa secunda</i> (juncifolia)	63%	30	8	40
<i>Spartina gracilis</i>	50%	15	3	30
<i>Juncus balticus</i>	38%	15	1	40
<i>Puccinellia lemmonii</i>	13%	3	3	3
<i>Schoenoplectus americanus</i>	13%	1	1	1
Forbs	100%	12	1	30
<i>Lactuca serriola</i>	50%	1	1	1
<i>Ranunculus cymbalaria</i>	38%	2	1	3
<i>Achillea millefolium</i>	25%	5	1	8
<i>Grindelia squarrosa</i>	25%	2	1	3
<i>Argentina anserina</i>	25%	1	1	1
<i>Potentilla argentea</i>	25%	1	1	1

Classification. This type is similar to the saltgrass community that occurs in western United States but may represent a new type. Clustered field sedge is absent from Hansen et al. (1995) saltgrass association in Montana. Crowe and Clausnitzer (1997) and the Oregon Natural Heritage Program (1999) describe a clustered field sedge association that has no saltgrass and occurs on wetter, perhaps less saline sites.

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Saltgrass - Chairmaker's bulrush community
Distichlis spicata* - *Schoenoplectus americanus
community

NVC code: C EGL001773

Plots 00RC014, 00RC103, 00RC221

Location. This community is found in localized sites across the Columbia Plateau. This bulrush-grass community was sampled along lower Crab Creek in Grant County and Foster Creek in Douglas County. It is probable in other parts of the Columbia Basin.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	16.5	5	28
width of floodplain (ft)	562.5	125	1000
entrenchment ratio	20.9	1.8	40
stream gradient (%)	0.9	0.6	1
Rosgen types	2 E6, spring		

Fluvial setting. This community is associated with streamsides and depressions with fine textured soils that stay wet into the growing season. It was sampled in moderate to broad canyons with low stream gradients. This community was sampled at or near bankfull. Sites are generally sloping (shorelines) with soils that are fine-textured. Mottling and/or gleying were not detected in the top 18 inches of two sample sites.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	0.2	0	0.4
percent slope	4.7	1	10
position	abandon channel, floodplain, first terrace		

PERCENT OF GROUND COVER	average	min	max
litter	83	65	95
moss	0	0	0
bareground	15	5	30
gravel	2	0	5
cobble-boulder	0	0	0
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0	0	0
texture	fibric, silty clay loam		

Vegetation. This is a dense grassland community less than a foot tall dominated by a rhizomatous bulrush, grass and sedge. Chairmaker's bulrush is always present with 20-80% cover. It always occurs with saltgrass and usually with clustered field sedge, Baltic rush, or silverweed cinquefoil. Alkali bluegrass or Lemmon's alkaligrass can be abundant. Management information is not available for this type. Pertinent management information on key species appears in Table 3.

LAYER HEIGHT (ft) average min max

Trees	10	0	20
Shrubs	1	0	1
Herbaceous	1.3	1.0	1.5

COMMON SPECIES	n=3 cover			
	constancy	average	min	max
Trees	33%	8	8	8
Elaeagnus angustifolia	33%	8	8	8
Shrubs	0%			
Graminoids	100%	155	126	203
Schoenoplectus americanus	100%	47	20	80
Distichlis spicata	100%	24	3	40
Carex praegracilis	67%	50	30	70
Juncus balticus	67%	27	3	50
Hordeum jubatum	67%	16	1	30
Puccinellia lemmonii	33%	30	30	30
Poa secunda (juncifolia)	33%	20	20	20
Hordeum brachyantherum	33%	8	8	8
Leymus cinereus	33%	3	3	3
Elytrigia repens var. repens	33%	3	3	3
Spartina gracilis	33%	3	3	3
Forbs	100%	45	35	51
Argentina anserina	67%	5	1	8
Chenopodium album	67%	3	3	3
Crepis runcinata	33%	40	40	40
Lactuca serriola	33%	30	30	30

Classification. *Schoenoplectus americanus* is synonymus with *Scirpus americanus* in Hitchcock and Cronquist (1973). Hansen et al. (1995) recognized a *Scirpus pungens* association in Montana that included all combinations of *S. pungens* and *S. americanus*. This type is a poorly described type recognized by Evans (1989) for eastern Washington.

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Alkali cordgrass community
***Spartina gracile* community**
 NVC code: CEG001588

Plots 00RC062, 00RC215

Location. This dense grass community was sampled along lower Crab Creek in Adams and Grant counties. It is probable in other parts of the Columbia Basin.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	11.7	8.3	15
width of floodplain (ft)	30	30	30
entrenchment ratio	1.5	1.5	1.5
stream gradient (%)	1.8	0.5	3
Rosgen types	B1, E6		

Fluvial setting. This community is associated with stream terraces and depressions with coarse textured soils that stay moist into the growing season. It was sampled in along streams with moderate to low gradients. This community was sampled above the floodprone zone. Sites are generally flat with soils that are coarse textured, well drained, and alkaline. A mottled soil layer was encountered at 8 inches at one site.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.1	1.1	1.1
percent slope	5.3	0.5	10.0
Position	first and second terraces		

PERCENT OF GROUND COVER	average	min	max
Litter	98	95	100
moss	0	0	0
bareground	2	0	5
gravel	0	0	0
cobble-boulder	0	0	0
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
texture	sand		
percent of coarse fragments (n=1)	0	0	0
depth to redox layer (in) (n=1)	8	8	8

Vegetation. This community is a closed grassland dominated by native rhizomatous species. Alkali cordgrass usually occurs with clustered field sedge. Nevada bulrush or Baltic rush can be abundant. Saltgrass is often present but with low cover. Forbs are mostly weedy species in the two samples. This type is similar to the saltgrass - clustered field sedge and the basin wildrye / clustered field sedge communities. Applicable management information is summarized in Hansen (1995 page 467). Pertinent management information on key species appears in Table 3.

LAYER HEIGHT (ft)	average	min	max
Trees	1	0	2

Shrubs	0	0	0
Herbaceous	2	2	2

COMMON SPECIES	n=2	cover		
	constancy	average	min	max
Trees	50%	3	3	3
Elaeagnus angustifolia	50%	3	3	3
Shrubs	0%	0	0	0
Graminoids	100%	109	155	177
Spartina gracilis	100%	50	40	60
Carex praegracilis	100%	2	1	3
Scirpus nevadensis	50%	60	60	60
Juncus balticus	50%	40	40	40
Distichlis spicata	50%	8	8	8
Forbs	100%	12	8	16
Lactuca serriola	100%	5.5	3	8
Cirsium arvense	50%	3	3	3
Equisetum laevigatum	50%	3	3	3

Classification. This type is poorly described from literature in Colorado. Hansen's (1995) Prairie cordgrass (*Spartina pectinata*) association includes combinations of prairie and alkali cordgrass. See Prairie cordgrass association page 75 for comparison in Washington.

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Basin wildrye - clustered field sedge community
***Leymus cinereus* - *Carex praeegracilis* community**
 NVC code: CEG0001480

Plots 98RC084, 98RC163, 98RC252, 99RC144, 99RC202, 00RC124

Location. This grassland was sampled along Cow Creek in Adams County, along Lake and Sinking Creeks in Lincoln County and along Foster Creek in Douglas County. It occurs on appropriate sites across the Columbia Plateau.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	28.8	2.5	120
width of floodplain (ft)	290	18	1500
entrenchment ratio	12.4	1.3	53.6
stream gradient (%)	1.0	0.0	2.0
Rosgen types	C3, C4, C6, 2 E6, F6		

Fluvial setting. This community is associated with broad stream terraces or depressions with deep fine textured soils that stay wet into the growing season. It was sampled in 100 foot and wider canyons with less than 3% gradient. This community was sampled at and above the floodprone zone and was observed along the margins of wide vernal basins. One site is within the floodprone zone. Sites are generally flat with soils that are fine-textured loamy and well drained. Gleying was detected at 40 inches at one sample and was undetected in the top 36 inches of two samples. See representative stream profile S1 page 31 and L2 page 51.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	1.3	0.5	2.3
percent slope	5.2	0	25
position	floodplain, first terrace, 2 second terraces, toeslope, basin		

PERCENT OF GROUND COVER			
litter	89	80	95
moss	1	0	5
bareground	9	5	20
gravel	0	0	0
cobble-boulder	0	0	0
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=2)	0	0	0
texture	loam, 2 silt loam		

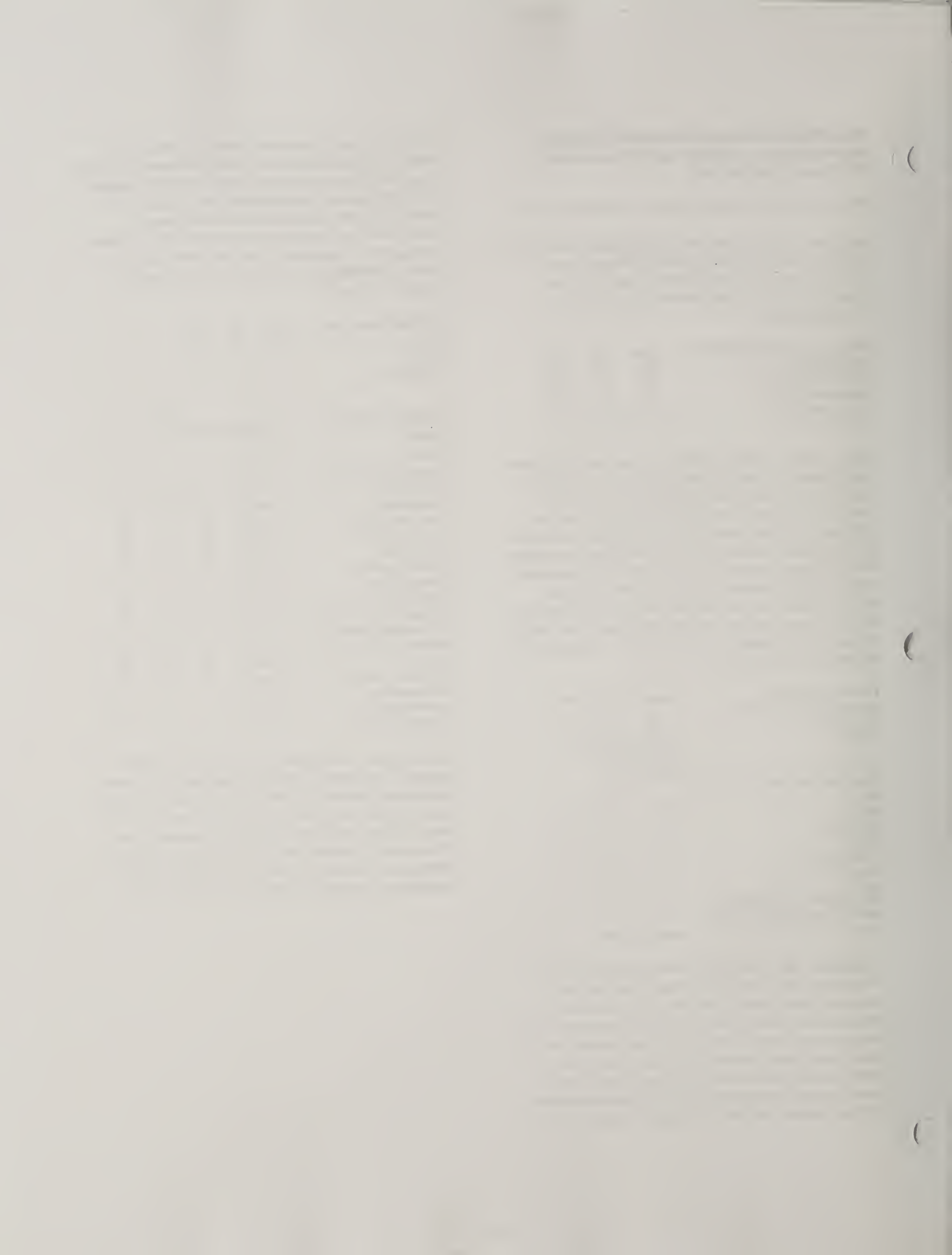
Vegetation. This is an open 5 to 8-foot tall bunchgrass community with a shorter, less than 2-foot tall, closed grassland ground cover dominated by rhizomatous grasses and sedges. Basin wildrye is always present and often abundant with 40-60% cover. On disturbed sites its cover can be greatly reduced in favor of quackgrass. Clustered field sedge is always present with 30 to 40% cover. Kentucky bluegrass, prairie cordgrass and Baltic rush are common and may be abundant. Saltgrass can be

a common species but subordinate to clustered field sedge. Claspings pepperweed, Rocky Mountain iris, and Canadian thistle are the most frequent forbs in samples. This type appeared adjacent to the less alkaline/saline more moist reed canarygrass and quaking aspen communities and saltgrass or greasewood communities. Management information is not available for this type. Pertinent management information on key species appears in Table 3.

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	0	0	0
Herbaceous	5.1	1.5	8

COMMON SPECIES	n=6		cover	
	constancy	average	min	max
Trees	0%			
Shrubs	50%	1	1	2
Symphoricarpos albus	17%	3	3	3
Rosa woodsii	17%	1	1	1
Graminoids	100%	104	10	141
Carex praeegracilis	100%	35	1	60
Leymus cinereus	100%	32	1	60
Poa pratensis	83%	20	3	50
Distichlis spicata	67%	9	1	30
Spartina gracilis	67%	9	1	20
Juncus balticus	50%	10	8	13
Elytrigia repens var. repens	33%	26	13	40
Poa secunda (juncifolia)	33%	7	1	13
Agrostis interrupta	17%	13	13	13
Forbs	100%	32	8	85
Lepidium perfoliatum	83%	3	1	8
Cirsium arvense	67%	7	1	20
Lactuca serriola	67%	6	1	20
Potentilla argentea	33%	8	3	13

Classification. Daubenmire's (1970) basin wildrye / saltgrass association is similar to this type but contains more alkali bluegrass, an abundance of saltgrass, has less clustered field sedge, and no Kentucky bluegrass. The basin wildrye / saltgrass association is generally less diverse and is probably associated with more saline or alkaline soil. This type is similar to the basin wildrye bottomland community that occurs in western U.S.



Basin wildrye-Saltgrass community
***Leymus cinereus* - *Distichlis spicata* community**
 NVC code: C EGL001481

Plots 98RC034, 98RC044, 98RC095

Location. This tall herbaceous community is located on the Columbia Plateau in Idaho, Oregon and Washington. This description is from samples from Cow Creek in Adams County and plots from Daubenmire (1970) in Douglas, Walla Walla, and Yakima counties.

STREAM CHARACTERISTICS	average	Min	max
width:depth ratio	54.7	14	120
width of floodplain (ft)	846.7	340	1600
entrenchment ratio	16.0	1.3	42.9
stream gradient (%)	0.5	0.5	0.5
Rosgen types	C1, C6c, F1		

Fluvial setting. This community is associated with stream terraces, vernal pools, and depressions with deep fine textured soils that stay moist into the growing season. On Cow Creek it was sampled in broad canyons with low stream gradients. It is within the floodprone zone. Soils are fine-textured, moderately drained, and alkaline. Mottling was detected at 28 inches at one site and undetected in the top 24 inches of another sample.

FLUVIAL SURFACE	average	Min	max
flooding potential index (FPI)	0.4	0.1	0.7
percent slope	2.0	0.5	5.0
Position	floodplain, 2 first terraces		
PERCENT OF GROUND COVER			
Litter	7	2	10
Moss	20	0	60
Bareground	69	20	98
Gravel	0	0	0
cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0
SOIL SURFACE HORIZON			
percent of coarse fragments (n=2)	0	0	0
texture	2 silt loam		

Vegetation. This community is composed of a tall bunchgrass usually over 4 feet tall scattered over a dense, shorter rhizomatous grass cover. Basin wildrye and saltgrass are always present with an average cover 30% and 50% respectively. Clustered field sedge averages 16% cover. Alkali bluegrass and prairie cordgrass are present in these plots but unusual in Daubenmire plots, whereas, cheatgrass occurred only in Daubenmire plots. Western yarrow was found in most plots. No other species appears in more than 30% of plots. This is a low diversity community with 5 to 17 species per plot. Management information applicable to this type is summarized in Hansen et al. (1995 page 431).

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	0	0	0
Herbaceous	3.7	1.0	5.0

COMMON SPECIES	n=3	cover		
	constancy	average	min	max
Trees	0%			
Shrubs	0%			
Graminoids	100%	106	70	124
Poa secunda (juncifolia)	100%	51	13	80
Distichlis spicata	100%	10	3	13
Carex praegracilis	100%	8	3	13
Leymus cinereus	100%	8	3	13
Spartina gracilis	100%	6	3	8
Poa secunda	33%	40	40	40
Forbs	100%	2	1	2
Achillea millefolium	67%	1	1	1
Cirsium vulgare	67%	1	1	1

Classification. This type is Daubenmire's (1970) basin wildrye / saltgrass association.



Basin wildrye - cheatgrass community
***Leymus cinereus* - *Bromus tectorum* community**
 NVC code: CEG001479

Plots 98RC024, 98RC184, 98RC233, 99RC064

Location. This community was sampled in Lincoln and Adams counties and is likely to occur on appropriate sites across the Columbia Plateau.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	18.6	5	30
width of floodplain (ft)	191	13	500
entrenchment ratio	9.3	2	26.3
stream gradient (%)	0.8	1	1
Rosgen types	B3c, C3, E4, E5		

Fluvial setting. This type is associated with a variety of drier fluvial landforms and upland sites. Valley gradient is less than 3%. It was sampled well above and just below the floodprone zone. Sites were flat to rolling with fine-textured and well-drained soil. See representative stream profile T3 page 22, L4 page 51, and G2 page 59.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.5	1	3.5
percent slope	2.9	0	10
position	2 intermittent channels, first terrace, toeslope		

PERCENT OF GROUND COVER	average	min	max
litter	86	70	100
moss	0	0	0
bareground	11	0	30
gravel	0	0	0
cobble-boulder	3	0	10
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=3)	3	0	10
texture	3 silt loam		

Vegetation. This grassland is often seen with a scattered tall basin wildrye layer (over 5 feet tall) over an annual and forb grass layer. Cheatgrass is the common link in these weedy sites. Other weeds that often are abundant include medusa head, Japanese brome, leporinum barley, prickly lettuce, tall tumble mustard, and giant sumpweed. This community appeared adjacent to more moist reed canarygrass or quackgrass communities and boxelder or upland communities. Similar communities are found outside the riparian zone. This is a retrogressed community probably on several different potential vegetation sites. Management information is not available to this type.

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	1
Shrubs	1	0	2
Herbaceous	6	5	7

COMMON SPECIES	n=4	cover		
	constancy	average	min	max
Trees	25%	1	0	1
Acer negundo	25%	1	1	1
Shrubs	50%	1	0	4
Artemisia ludoviciana	25%	3	3	3
Ericameria nauseosa ssp. nauseosa	25%	1	1	1
Graminoids	100%	63	62	91
Leymus cinereus	100%	40	20	90
Bromus tectorum	100%	30	1	60
Bromus japonicus	25%	20	20	20
Poa secunda	25%	8	8	8
Forbs	100%	38	10	71
Lepidium perfoliatum	50%	12	3	20
Sisymbrium altissimum	50%	3	3	3
Iva xanthifolia	25%	40	40	40
Conium maculatum	25%	30	30	30
Claytonia perfoliata ssp. perfoliata	25%	20	20	20
Descurainia sophia	25%	13	13	13
Rumex salicifolius	25%	8	8	8
Collinsia linearis	25%	8	8	8
Chenopodium album	25%	8	8	8
Senecio serra	25%	3	3	3
Senecio integerrimus	25%	3	3	3

Classification. Crawford (1998) described this type. It is a common vegetation type throughout the inland Pacific Northwest and classified as a provisional type.

Black greasewood / Saltgrass community
Sarcobatus vermiculatus / *Distichlis spicata*
community
 NVC code: CEG001363

Plots 00RC012, 00RC013, 00RC223

Location. This shrub community is located on the Columbia Plateau in Idaho, Oregon and Washington. This description is from samples from lower Crab Creek in Grant County and plots from Daubenmire (1970) in Douglas, Walla Walla, Whitman, and Yakima counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	12.7	5	28
width of floodplain (ft)	567	125	1000
entrenchment ratio	27.3	1.8	40
stream gradient (%)	0.7	0.6	1
Rosgen types	2 E6		

Fluvial setting. This community is associated with stream terraces, vernal pools and depressions with deep fine textured soils that stay moist into the growing season. It was sampled in broad canyons with low stream gradient. It is within and above the floodprone zone. Soils are fine-textured, moderately drained, and alkaline. Gleying was detected at 6 and 10 inches in both soils sampled. See representative stream profile L2 page 51.

FLUVIAL SURFACE

flooding potential index (FPI)	0.6	0.1	1.4
percent slope	6.3	5	8
Position	first and second terrace		

PERCENT OF GROUND COVER

Litter	43	20	80
Moss	0	0	0
Bareground	57	20	80
Gravel	0	0	0
cobble-boulder	0	0	0
Bedrock	0	0	0
Water	0	0	0

SOIL SURFACE HORIZON

percent of coarse fragments (n=2)	0	0	0
texture	silty clay loam, silty clay		

Vegetation. This is a shrubland community over 2 to 4 feet tall with a dense, shorter rhizomatous grass cover that typically occurs in patches. Black greasewood and saltgrass are always present with an average cover of 30% and 50% respectively. Basin wildrye is present in these plots but unusual in Daubenmire plots. Alkali bluegrass is in half of Daubenmire's plots. No other species appears in more than 30% of plots.

LAYER HEIGHT (ft) average min max

Trees	0	0	0
Shrubs	3	2	4
Herbaceous	2.2	0.7	5

COMMON SPECIES	n=3 cover			
	constancy	average	min	max
Trees	0%			
Shrubs	100%	38	13	61
<i>Sarcobatus vermiculatus</i>	100%	38	13	60
Graminoids	100%	59	27	83
<i>Distichlis spicata</i>	100%	51	13	80
<i>Leymus cinereus</i>	67%	7	1	13
<i>Agrostis interrupta</i>	33%	3	3	3
<i>Carex praegracilis</i>	33%	1	1	1
<i>Juncus balticus</i>	33%	1	1	1
<i>Elytrigia intermedia</i>	33%	1	1	1
<i>Hordeum jubatum</i>	33%	1	1	1
<i>Schoenoplectus americanus</i>	33%	1	1	1
Forbs	100%	5	1	14
<i>Lactuca serriola</i>	67%	1	1	1
<i>Chenopodium album</i>	33%	8	8	8
<i>Lepidium perfoliatum</i>	33%	3	3	3
<i>Bassia hyssopifolia</i>	33%	1	1	1

Classification. Although two plots have basin wildrye, this is not the black greasewood / basin wildrye association (CEGL001366) in Idaho and eastward that has typically contains *Gutierrezia sarothrae*, *Pascopyrum smithii*, *Pseudoroegneria spicata*, *Koeleria macrantha*, *Carex filifolia* and *Opuntia polyacantha*. This type is Daubenmire's (1970) black greasewood / saltgrass association.

Annual hairgrass - curlycup gumweed community
Deschampsia danthonioides - *Grindelia squarrosa*
community

NVC code: none

Plots 98RC045, 98RC175, 98RC0192

Location. This herbaceous community is a previously unrecognized type although similar communities are known at other eastern Washington and Oregon locales. It was sampled in Adams, Douglas, and Grant counties.

STREAM CHARACTERISTICS	average	Min	Max
width:depth ratio	40	30	50
width of floodplain (ft)	420	340	500
entrenchment ratio	3.6	3.3	3.8
stream gradient (%)	0.5	0.5	0.5
Rosgen types	C1, E1		

Fluvial setting. This community occurs in vernal pools and depressions with gravelly to rocky soils. It was sampled in broad canyons with low stream gradients. It appears along streams in an exposed basalt scabland channel and in an abandoned scabland channel. Sites are generally concave and appear to rarely flood. They likely fill more frequently with precipitation. Soils are coarse-textured and well drained. See representative stream profile L1 page 51.

FLUVIAL SURFACE	average	Min	max
flooding potential index (FPI)	0.2	0.1	0.3
percent slope	0	0	0
position	floodplain, abandoned channel		

PERCENT OF GROUND COVER			
litter	43	5	80
moss	3	0	5
bareground	25	15	35
gravel	10	0	20
cobble-boulder	20	0	40
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON			
percent of coarse fragments (n=1)	90	90	90
texture	gravel, stony		

Vegetation. This is an open herbaceous community that is less than a foot tall. Annuals and perennials with short growing seasons dominate this community. Annual hairgrass is usually present and common. Other annual grasses include cheatgrass, dense silkybent, and leporinum barley. Important forbs include curlycup gumweed, clasping pepperweed, and western yarrow. This type appeared adjacent to deeper soil sites in the floodplain with saltgrass - clustered field sedge communities. Upland vegetation of annual grasses, stiff sagebrush scabland or sparsely vegetated bedrock was on higher sites. One plot was located in a vernal pond with

a 1-4 inch layer of white, fine textured soil with little vegetation and may be included in this generalized community. Pertinent management information on key species appears in Table 3.

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	0	0	0
Herbaceous	2	1	4

COMMON SPECIES	n=2 cover			
	constancy	average	min	max
Trees	0%			
Shrubs	100%	1	0	1
Atriplex truncata	50%	1	1	1
Graminoids	100%	39	56	60
Deschampsia danthonioides	100%	29	8	50
Bromus tectorum	100%	5	1	8
Hordeum murinum ssp. leporinum	100%	1	1	1
Agrostis interrupta	50%	30	30	30
Poa secunda (juncifolia)	50%	8	8	8
Juncus bufonius	50%	3	3	3
Puccinellia lemmonii	50%	1	1	1
Puccinellia distans	50%	1	1	1
Forbs	100%	59	59	59
Lepidium perfoliatum	100%	21	1	40
Achillea millefolium	100%	5	1	8
Grindelia squarrosa	50%	40	40	40

Classification. This type is included in a proposed annual hairgrass community that occurs in eastern Washington, Oregon and California. It includes vernal pond zones 1 and 2 defined by Bjork (1997).

Bluebunch wheatgrass community
***Pseudoroegneria spicata* community**
 NVC code: none

Plots 99RC20, 00RC082, 00RC093

Location. This herbaceous community is a previously unrecognized riparian type although similar communities are known in Washington and Oregon. Samples are from Douglas, Grant, and Lincoln counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	10.8	6	14
width of floodplain (ft)	7	2	13
entrenchment ratio	1.3	1.3	1.3
stream gradient (%)	5.3	1	8
Rosgen types	3 A3		

Fluvial setting. This community occurs near ephemeral and intermittent streams in moderate to narrow valleys. Streams have moderate to steep gradients. Sites are well above the floodprone zone unless where associated with ephemeral streams when appears in the floodprone zone. In either case, sites rarely flood. Soils are coarse-textured and well drained. See representative stream profile S7 page 32.

FLUVIAL SURFACE	average	Min	max
flooding potential index (FPI)	1.8	-0.4	3.4
percent slope	5.5	5	6
position	floodplain, first terrace, streambank		

PERCENT OF GROUND COVER	average	min	max
litter	48	30	65
moss	13	5	20
bareground	13	5	20
gravel	16	12	20
cobble-boulder	17	8	25
bedrock	0	0	0
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=2)	0	0	0
texture	cobble, sandy loam		

Vegetation. This is an open herbaceous community that is around two feet tall and dominated by annual and perennial herbaceous plants. Shrubs are usually present as scattered individuals. Both Wyoming and Basin big sagebrush occur in this community. Bluebunch wheatgrass and Sandberg's bluegrass are always present although cheatgrass will have greater cover in many instances. Western yarrow is the most frequent forb species. Pertinent management information on key species appears in Table 3.

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0
Shrubs	6	5	6
Herbaceous	2	1	2

COMMON SPECIES	n=3	cover		
	constancy	average	min	max
Trees	0%			
Shrubs	100%	13	2	33
Artemisia tridentata ssp. tridentata	33%	30	30	30
Ericameria nauseosa ssp. nauseosa	33%	8	8	8
Artemisia tridentata ssp. wyomingensis	33%	3	3	3
Graminoids	100%	33	15	64
Bromus tectorum	100%	13	8	20
Poa secunda	100%	8	1	20
Pseudoroegneria spicata	100%	6	3	13
Elymus lanceolatus	33%	30	30	30
Vulpia spp	33%	10	10	10
Forbs	100%	15	15	23
Achillea millefolium	67%	1	1	1
Equisetum laevigatum	33%	20	20	20
Epilobium minutum	33%	8	8	8
Pteryxia terebinthina var. terebinthina	33%	8	8	8
Artemisia biennis	33%	3	3	3
Mosses	33%	5	5	5

Classification. This is a previously undescribed riparian type. It is similar to upland big sagebrush communities and is usually included within the variation of those types.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy auditing of the accounts.

In the second section, the author details the various methods used to collect and analyze data. This includes both primary and secondary research techniques. The goal is to gather comprehensive information that can be used to identify trends and make informed decisions.

The third section focuses on the challenges faced during the data collection process. It highlights the need for clear communication and coordination between different teams. Additionally, it discusses the importance of data security and privacy, ensuring that all information is handled in accordance with relevant regulations.

Finally, the document concludes with a summary of the key findings and recommendations. It suggests that regular reviews and updates to the data collection process are essential for maintaining the accuracy and reliability of the information. The author also notes that ongoing communication and collaboration are key to the success of any data-driven project.

Miscellaneous Grass-like and Grass Riparian Types

Baltic rush community

Juncus balticus community

NVC code: CEG001838

Plots 99RC183, 00RC022

Washington samples are from Crab Creek in Adams and Grant counties. This community is associated with sites along rivers and lakes that tend to flood annually and with soils that are wet to moist through much of the growing season. It was sampled near 2% gradient streams. It appears low in the floodprone zone on a E6 Rosgen stream type and near a spring. See representative stream profiles L3 and L4 page 51. Soils typically have high organic matter content in surface layers and fine-textured mineral soil.

This is a dense herbaceous community dominated by an aggressive rhizomatous species. Baltic rush is always present and usually abundant (50-80% cover). Clustered field sedge, Kentucky bluegrass, and bentgrass appear abundantly in one sample. Canadian thistle is abundant typically accompanied by other weedy species. Silverweed cinquefoil and Rocky Mountain iris are absent. This type is the Baltic rush community that occurs across the western United States. This community is a "converted" community from continued overgrazing in wet meadow environments (Montana technical guide to rangelands 1997). Clustered field sedge is co-dominant with Baltic rush in plot 00RC122 and may represent the clustered field sedge association (CEGL00182) of Evans (1989). Management information applicable to this type is summarized in Hansen et al. (1995 page 445) and Crowe and Clausnitzer (1997 page 194). Both authors consider this a grazing disclimax community.

Tufted hairgrass association

Deschampsia cespitosa association

NVC code: none

Plots 99RC132, 99RC133

This grass-dominated community is similar to several tufted hairgrass types found throughout the interior Pacific Northwest. Lincoln County supports the only known site on the Columbia Basin in Washington. In the Blue Mountains, this community appears on floodplains along Rosgen C4, C6, and E6 stream types, in wet basins, and near springs. These sites flood during spring runoff and dry to 12 to 32 inches by midsummer but

remain moist throughout the growing season. Soils are deep and fine-textured content. In Lincoln County, it was sampled at a single spring location in a 200-foot wide valley on two different surfaces. This community occurred in a perennial spring meadow with a ditched stock pond and stream. Surfaces measured 1 and 3 inches above current water level in June. Both sites had well-developed, 7 and 9 inches thick, humic layers, over a restrictive, gleyed silty clay loam layer. See representative stream profile L3 page 51.

This open bunchgrass community with sedges and rushes is 3 feet tall. Tufted hairgrass dominates the tallest layer with 40-50% cover. Dense 1 to 2-foot tall Baltic rush, woolly sedge, clustered field sedge, and creeping bentgrass layer grows below and around the tufted hairgrass. Nebraska sedge co-dominated the higher surface while Baltic rush co-dominated the lower surface that had 20% moss cover on the ground surface. Both of the above co-dominant species increase with livestock use. The sample location is used by livestock. Northern willowherb, silver cinquefoil and narrowleaf miner's lettuce are common forbs in this community. Overall forb diversity is low and provides only 13% average cover. This community lies between a woolly sedge community and Nebraska sedge or a Kentucky bluegrass community. The adjacent uplands are Wyoming big sagebrush and stiff sagebrush. This type is similar to an association described by Kovalchik (1987; 30 plots), Kovalchik (1992; 3 plots) and Crowe and Clausnitzer (1997; 29 plots). The Oregon Natural Heritage Program (1998) describes a similar but montane tufted hairgrass - Nebraska sedge association. Management information applicable to this type is summarized in Kovalchik (1987 page 95).

Prairie Cordgrass

Spartina pectinata

NVC code: none

Plot 99CB243

This streamside grass community primarily occurs in the northern Great Plains. In Washington, it occurs above and below Palouse Falls and along a short stretch of the Spokane River. It appears in 100 to 1000-foot wide canyons with 1-3% gradient with rivers 100-200 feet wide. It lines the river on channel shelves near bankfull with cobbly soils. Rosgen stream type B2 is expected.

This is a dense herbaceous community dominated by perennial 2 to 3-foot tall prairie cordgrass. Few species appear in this community, such as, reed canarygrass and sandbar willow. This site appeared next to the channel

and a sandbar willow community. It occurs in Wyoming big sagebrush/bluebunch wheatgrass and ponderosa pine/bunchgrass landscapes. Hansen et al. (1995) describe a similar community (CEGL001476) in Montana across a wider environmental range than in Washington. Management information is available in Hansen et al. (1995 page 466).

Intermediate wheatgrass pasture

***Elytrigia intermedia* pasture**

NVC code: none

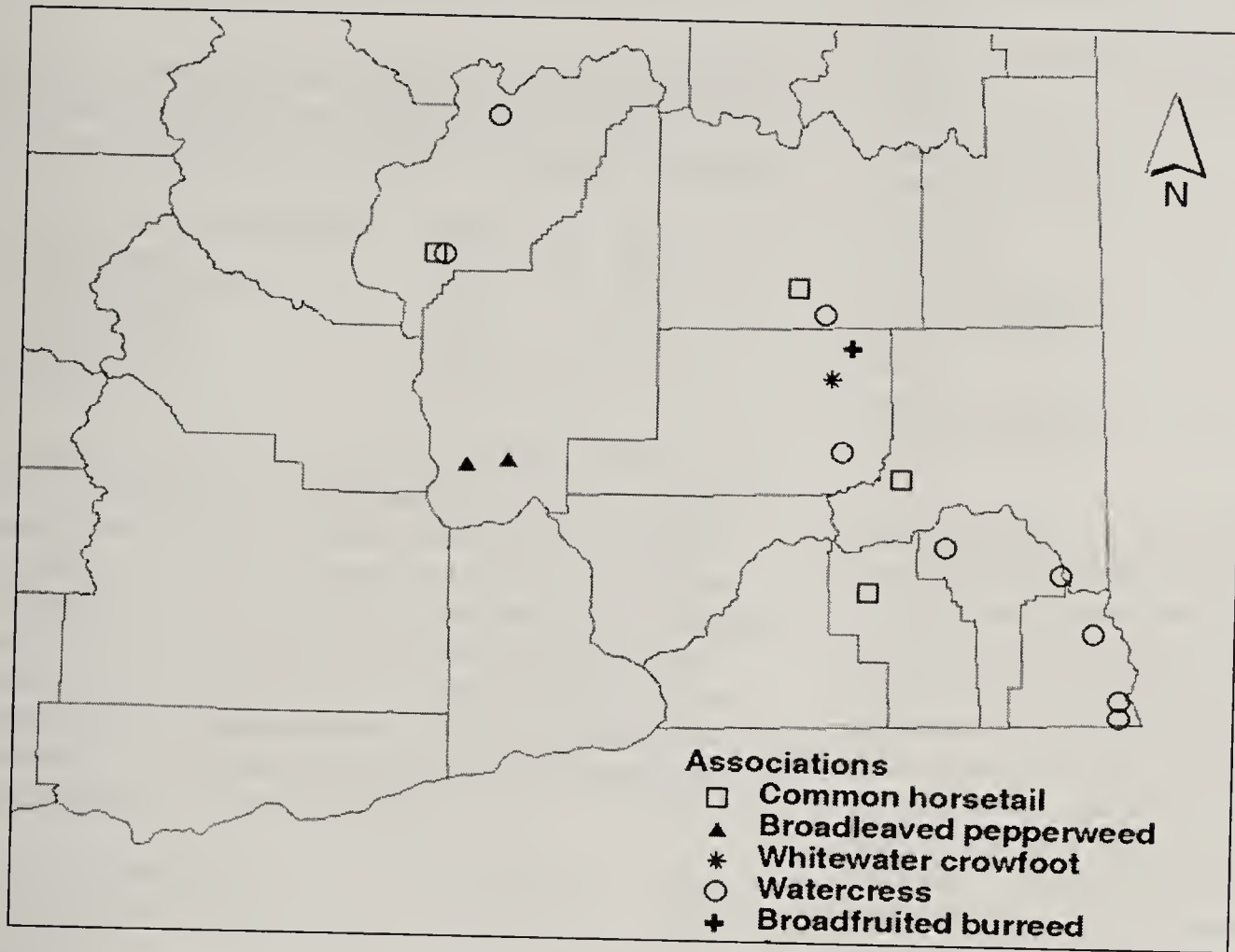
Plots 98RC094, 98RC132

This semicultivated community was described along Cow Creek in Adams County and unsampled but present along Crab and Foster creeks. This community is associated with broad stream terraces and depressions with deep fine textured soils that stay wet into the growing season. On Cow Creek, it was sampled in broad canyons with low stream gradients. This community was sampled within and well above the floodprone zone (FPI 0.6-3) and associated with Rosgen stream types C6c and G3. Sites are generally flat with soils that are fine-textured, well drained, and alkaline

This community is composed of a planted, exotic tall bunchgrass with a shorter, typically closed grassland that is dominated by native rhizomatous species. Tall intermediate wheatgrass occurs with clustered field sedge, quackgrass or saltgrass ground cover. Each of the shorter species can appear abundantly. Prairie cordgrass and Baltic rush are common and may be abundant. This type is similar to the saltgrass - clustered field sedge and the basin wildrye / clustered field sedge communities. Along Cow Creek, this type appeared adjacent to the less alkaline/saline, more moist reed canarygrass, sandbar willow, quackgrass and bentgrass communities and saltgrass or greasewood or upland communities. This type is undescribed and may be considered a planted saltgrass - clustered field sedge or basin wildrye / clustered field sedge community. A partial exclosure indicates these pastures apparently will support Wood's rose shrublands with less livestock use. Management information is not available for this type. NRCS has a wealth of applicable information on pasture management. Pertinent management information on key species appears in Table 3.

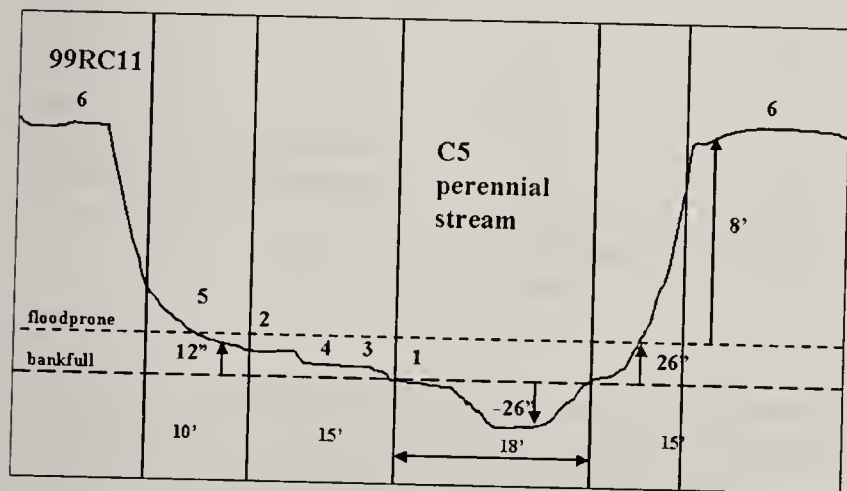
Forb Riparian Vegetation Types

Plot locations

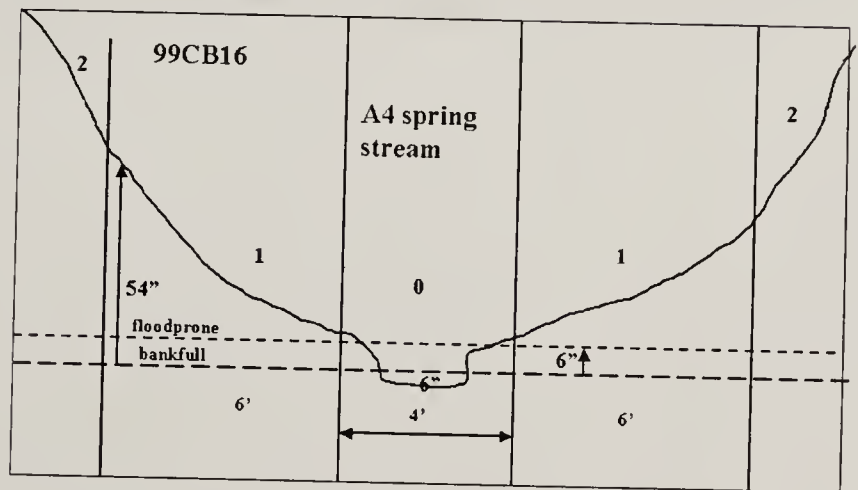


Selected stream profiles

F1



F2



Stream and riparian vegetation profile at Coal Creek, Lincoln County. 1= reed canarygrass, 2= common horsetail, 3= woolly sedge – common spikerush and 4= Nebraska sedge - silverweed cinquefoil, 5= Baltic rush, and 6= basin wildrye - cheatgrass.

Stream and riparian vegetation profile at Green Creek, Asotin County. 0=watercress, 1=black hawthorn / common snowberry, and 2 = bunchgrass uplands.

Common Horsetail community
***Equisetum arvense* community**
 NVC code: none

Plots 99CB501 99CB502, 99CB701, 99CB702, 99CB704, 99RC112, 00RC191

Location. This herbaceous community type is similar to a type described in Oregon. Sample locations are in southeast Washington and Douglas, and Lincoln counties.

STREAM CHARACTERISTICS	average	min	max
width:depth ratio	8.3	5	12
width of floodplain (ft)	15.3	9	41
entrenchment ratio	2.0	2	2.3
stream gradient (%)	2.9	1	5.0
Rosgen types	A3, B1, 2 B6, C5		

Fluvial setting. This community appears in valleys with 1-3% gradients and 30 to 1000 feet wide. Surface slopes varied from 1 to 56%. Communities appear on various positions near bankfull to well above bankfull. Surface soil layer are 5 to 14 inches thick and have fine sandy loam to silty clay loam texture. Subsurface layers vary from gravel to buried histic soils. The higher terraces are sub-irrigated from adjacent slopes. Most of these sites have evidence of scouring flood events. See representative stream profiles F1 page 77 and S5 page 32.

FLUVIAL SURFACE	average	min	max
flooding potential index (FPI)	2.3	0.4	7.5
percent slope	21.4	1	56
position	floodplain, abandon channel, 2 first terraces, streambank		

PERCENT OF GROUND COVER	average	min	max
litter	78	20	99
moss	0	0	0
bareground	13	1	40
gravel	3	0	20
cobble-boulder	6	0	40
bedrock	0	0	3
water	0	0	0

SOIL SURFACE HORIZON	average	min	max
percent of coarse fragments (n=4)	15	0	60
texture	silt loam, fine sandy loam, sandy clay loam, silty clay loam		

Vegetation. Common horsetail dominates or co-dominates all plots with 30-80% cover. Baltic rush is co-dominant on most of those sites. Kentucky bluegrass is the most consistent companion and sometimes occurs abundantly. Other species that dominated individual plots were smooth brome, common spikerush, and small-fruited bulrush. Several tree and shrub species occur in this community and usually represent remnants of previous vegetation.

LAYER HEIGHT (ft)	average	min	max
Trees	0	0	0

Shrubs	1	0	4
Herbaceous	1	1	2

COMMON SPECIES	n=7 cover			
	constancy	average	min	max
Trees	43%	5	1	10
Salix alba	14%	10	10	10
Populus balsamorrhiza ssp. trichocarpa	14%	8	8	8
Shrubs	43%	9	1	24
Cornus sericea	29%	1	1	1
Amelanchier alnifolia	14%	8	8	8
Artemisia ludoviciana	14%	8	8	8
Graminoids	100%	57	13	95
Poa pratensis	100%	11	3	30
Juncus balticus	57%	40	1	90
Scirpus microcarpus	43%	14	1	40
Eleocharis palustris	29%	29	8	50
Forbs	100%	70	40	99
Equisetum arvense	100%	54	30	80
Amsinckia lycopsoides	71%	1	1	1
Mosses	29%	1	1	1

Classification. This may represent the common horsetail type described by the Oregon Natural Heritage Program (1998, 6 plots) or by Crowe and Clausnitzer (1997, 5 plots). The wide range of co-dominant species and environments indicate that this is either an early seral community with a wide natural range of variation or a cover type containing several yet described community types. Further sampling may indicate splitting this broad type into different community types. Several plots have affinities with this common horsetail type although dominated by different tree species: Yellow willow / common horsetail (*Salix lutea* / *Equisetum arvense*) community, plot 00RC201, and Peachleaf willow / common horsetail (*Salix amgydoides* / *Equisetum arvense*) community, plot 00RC171, all on on a scoured reaches of Douglas Creek, and a Water birch / common horsetail (*Betula occidentalis* / *Equisetum arvense*) community plot 00RC133, associated with a spring feeding East Foster Creek.

Watercress association

***Rorippa nasturtium-aquaticum* association**

NVC code: none

Plots 98RC200, 99CB1300, 99CB1600, 99CB1800, 99CB2000, 99CB2100, 99RC180, 00RC130, 00RC200

Location. This community type is found throughout the western United States. In Washington, it has been sampled in Adams, Asotin, Douglas, Garfield, Grant, and Lincoln counties.

STREAM CHARACTERISTICS			
	average	min	max
width:depth ratio	15.9	7.2	30
width of floodplain (ft)	18.1	6	40
entrenchment ratio	1.8	1.2	3
stream gradient (%)	4.8	0.5	13
Rosgen types	2-A3a, A4, B3, B4, C2, F3b, spring		

Fluvial setting. This community typically occurred with moderate to low stream gradients and relatively narrow stream widths. This community occurred along spring-fed channels and at a spring source. It appears at and below the floodprone zone on sites that are perennially flooded. At time of sampling, most of the sites were under slow moving water. Any exposed surface was either rock or gravel. Most soils are organic and shallow although a gleyed horizon appeared 16 inches below a mucky, organic surface layer at one sample site. See representative stream profile S4 page 31.

FLUVIAL SURFACE			
	average	min	max
flooding potential index (FPI)	-0.8	-1.3	0.0
percent slope	5.4	0.5	13.0
position	4 aquatic beds, 3 channel shelves, 2 springs		

PERCENT OF GROUND COVER			
litter	18	0	90
moss	3	0	15
bareground	1	0	10
gravel	6	0	29
cobble-boulder	18	0	40
bedrock	0	0	0
water	54	10	94

SOIL SURFACE HORIZON			
percent of coarse fragments (n=3)	0	0	0
texture	hemic, sapric, sandy clay loam		

Vegetation. This is a dense herbaceous community dominated by annual aquatic species that typically is less than 6 inches tall. It may be underneath overhanging shrubs or tall marsh plants growing on adjacent, higher fluvial surfaces. Watercress is dominant in all sites and was always associated with either seep monkeyflower or water speedwell or both. Species from adjacent less wet surfaces are present and varied by sites. This community occurred in the channel adjacent to white alder / Lewis' mockorange, black hawthorn, snowberry, serviceberry / western poison ivy community and Nebraska sedge

communities.

LAYER HEIGHT (ft)	average	min	max
Trees	1	0	3
Shrubs	2	0	8
Herbaceous	1	1	2

	n=9	cover		
	constancy	average	min	max
Trees	11%	1	1	1
Salix amygdaloides	11%	1	1	1
Shrubs	11%	1	1	1
Salix lutea	11%	1	1	1
Graminoids	78%	14	0	40
Agrostis stolonifera	33%	15	1	40
Polypogon monspeliensis	33%	2	1	3
Juncus balticus	22%	7	1	13
Phalaris arundinacea	11%	13	13	13
Carex nebrascensis	11%	8	8	8
Carex pauciflora	11%	1	1	1
Carex lanuginosa	11%	1	1	1
Carex deweyana	11%	1	1	1
Carex amplifolia	11%	1	1	1
Forbs	100%	62	3	101
Rorippa nasturtium-aquaticum	100%	37	1	90
Veronica anagallis-aquatica	89%	4	1	20
Mimulus guttatus	67%	8	1	40
Epilobium ciliatum ssp. watsonii	44%	3	1	3
Mosses	22%	18	5	30

Classification. Evans (1989) noted that was relatively common on slow moving streams and springs in central Washington. The Oregon Natural Heritage Program (1998) listed 1 plot for this association.

Micellaneous Forb Riparian Types

Whitewater crowfoot

Ranunculus aquatilis

NVC code: none

Plot 98RC40

This submerged vegetation has been observed in aquatic beds across Washington and Oregon. It was sampled in the channel of a C1 Rosgen stream type and associated with perennially flooded channels with a rocky, cobbly bottom. It was in a broad canyon with low stream gradient. This is often a dense herbaceous community dominated by a perennial aquatic plants. The only other common vascular species were common duckweed, arumleaf arrowhead, and pondweed species. Algae, mosses, and freshwater sponges have been observed with this community. The sample site occurs in the channel adjacent to a woolly sedge community. This type is undescribed although it may resemble the *Ranunculus aquatilis* - *Callitriche palustris* herbaceous vegetation (CEGL001984) described in Colorado. A similar community is recognized by the Oregon Natural Heritage Program (1999).

Broadfruit burreed

Sparganium eurycarpum plot

NVC code: none

Plot 98RC231

This herbaceous vegetation has been observed in Adams and Lincoln counties although not sampled in the latter. It also is recognized in Oregon and western Washington. This 5-foot tall herbaceous community was sampled on a channel shelf 6 inches below bankfull on B3c Rosgen stream type. This community is associated with sites prone to yearly flooding and with soils that can stay flooded throughout the growing season. It was sampled in a narrow canyon with low stream gradient. Soil was high in organic content in the surface layer and associated with fine-textured mineral soil.

This is a dense herbaceous community is dominated by a rhizomatous species that looks superficially like broadleaf cattail. Broadleaf burreed dominated the sample and occurred with common spikerush. This site appeared along the channel and reed canarygrass communities. This type is undescribed from east of the Cascades. A similar cover type has been described from western Washington. Evans (1989) notes that this community is common in Lincoln County. Pertinent management information on key species appears in Table 3.

Broadleaved pepperweed

Lepidium latifolium community

NVC code: none

Plots 00RC011, 00RC021

This herbaceous vegetation has been observed in Grant and Yakima counties and is likely in surrounding counties. Broadleaved pepperweed is an exotic plant that apparently is invading and creating a new community type. This 4 to 6-foot tall herbaceous community was sampled along the wet fringe of lower Crab Creek. This community is associated with sites prone to yearly flooding and with soils that can stay flooded throughout the growing season. It was sampled in a broad canyon with low stream gradient. Soil surface layers and associated with fine-textured mineral soil. The stream is a Rosgen E6 stream type that is part of a regulated hydrologic system dominated by irrigation. The soil surface is completely obscured by litter.

This is a dense herbaceous community dominated by an aggressively invasive, rhizomatous species. Most of the associated species are wet site species that are tolerant of disturbance, such as, Baltic rush, Canada thistle, Fuller's teasel, and stinging nettle. Both broadleaf cattail and hardstem bulrush are present. This is a new vegetation type that is either a mid-seral community to Hardstem bulrush – broadleaf cattail association or the initial stage of a new ecosystem type dominated by an exotic species. Pertinent management information on key species appears in Table 3.

Columbia Basin Riparian Associations not sampled

Several reports from different parts of the Columbia Basin in Washington have listed riparian vegetation types, most of which have affinities to or are the equivalent to the those described in this report. The following is a list of types recognized by other authors but not discussed in this report. Each type appears with its expected environmental distribution in the Washington and the author of the type.

NVC code	Community type	Habitat	Source	plot #
Tree- dominated				
CEGL000866	Pinus ponderosa / Symphoricarpos albus floodplain Forest	river terraces	Crowe & Clausnitzer 1997	9
CEGL000668	Populus balsamifera ssp. trichocarpa - Alnus rhombifolia Forest	river terrace	Daubenmire 1970	0
CEGL000667	Populus balsamifera ssp. trichocarpa / Alnus incana Forest	river terrace	Evans 1989 Kovalchik 1992	2
CEGL000671	Populus balsamifera ssp. trichocarpa / Cicutia douglasii Forest	river terrace	Daubenmire 1970	10
CEGL000672	Populus balsamifera ssp. trichocarpa / Cornus sericea Forest	river terrace	Evans 1989	0
none	Populus balsamifera ssp. trichocarpa / Equisetum hymenale Forest	floodplain	Kovalchik 1992 Salstrom & Easterly 1995	1 8
CEGL000577	Populus tremuloides / Carex lanuginosa Forest	springs	Kovalchik 1992	1
CEGL000550	Quercus garryana Temporarily Flooded Woodland	river terrace	John et al. 1988	3
CEGL001094	(Populus tremuloides) - Crataegus douglasii / Heracleum maximum Shrubland	river terrace	Evans 1989 Daubenmire 1970	12 3
CEGL001081	Betula occidentalis / Crataegus douglasii Shrubland	river terrace	Evans 1989	6
CEGL000948	Salix amygdaloides / Salix exigua Woodland	river terrace	Evans 1989	1
CEGL001215	Salix lucida ssp. caudata Shrubland [Provisional]	floodplain	Evans 1989	1
Shrub dominated				
CEGL001201	Salix exigua / Equisetum arvense Shrubland	floodplain	Evans 1989	7
CEGL001200	Salix exigua / Barren Shrubland	floodplain	Crowe & Clausnitzer 1997 Salstrom & Easterly 1995	9 2
Grass and Graminoid dominated				
none	Glyceria striata herbaceous vegetation [PROVISIONAL]	fen	Evans 1989	2
CEGL001825	Carex simulata Herbaceous Vegetation	fen	Evans 1989	1
CEGL001843	Scirpus maritimus Herbaceous Vegetation	river edge	Salstrom & Easterly 1995	4
CEGL001516	Sporobolus cryptandrus - Poa secunda	river bar	Daubenmire 1970 Tisdale 1986	4 6
CEGL001475	Phragmites australis Herbaceous Vegetation	pond edge	Evans 1989	2
Forb dominated				
none	Apocynum cannabinum-A. (lindleyana, ludoviciana)	river bar	Salstrom & Easterly 1995	4
CEGL002001	Nuphar lutea ssp. polysepala Herbaceous Vegetation	pond	Kovalchik 1992	5

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